

SEQUENCE LISTING

<110> Handfield, Martin
Hillman, Jeffrey
Progulske-Fox, Ann

<120> Identification of Actinobacillus actinomycetemcomitans Antigens for Use
in the Diagnosis, Treatment, and Monitoring of Periodontal Diseases

<130> MBHB01-662

<140> To be assigned

<141> Filed herewith

<160> 234

<170> PatentIn version 3.0

<210> 1

<211> 560

<212> DNA

<213> Actinobacillus actinomycetemcomitans

<220>

<221> CDS

<222> (1) .. (555)

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| agc | gat | tgg | ctg | gca | ttt | atg | tta | agc | ggc | gaa | ctg | gcg | gtg | gaa | cct | 48 |
| Ser | Asp | Trp | Leu | Ala | Phe | Met | Leu | Ser | Gly | Glu | Leu | Ala | Val | Glu | Pro | |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|
| tcc | aat | gcg | ggc | acg | acc | ggc | atg | ttg | aac | ctg | aca | aca | cgt | caa | tgg | 96 |
| Ser | Asn | Ala | Gly | Thr | Thr | Gly | Met | Leu | Asn | Leu | Thr | Thr | Arg | Gln | Trp | |
| | | 20 | | | | | | 25 | | | | | 30 | | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| tcg | ccg | gaa | tta | ctg | gat | atg | gcg | ggg | tta | aat | tca | aat | att | ctg | acg | 144 |
| Ser | Pro | Glu | Leu | Leu | Asp | Met | Ala | Gly | Leu | Asn | Ser | Asn | Ile | Leu | Thr | |
| | | 35 | | | | | 40 | | | | | 45 | | | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| ccg | ata | aaa | gaa | acc | ggc | acg | cgt | tta | ggc | gaa | gtg | act | tca | gaa | gtt | 192 |
| Pro | Ile | Lys | Glu | Thr | Gly | Thr | Arg | Leu | Gly | Glu | Val | Thr | Ser | Glu | Val | |
| | 50 | | | | | 55 | | | | | 60 | | | | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| gca | caa | caa | acc | ggc | tta | ata | cag | ggc | aca | ccg | gtt | gtg | gtc | ggc | ggc | 240 |
| Ala | Gln | Gln | Thr | Gly | Leu | Ile | Gln | Gly | Thr | Pro | Val | Val | Val | Gly | Gly | |
| 65 | | | | | 70 | | | | 75 | | | | | 80 | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| ggg | gac | gtg | cag | tta | ggc | tgt | att | ggc | tta | ggc | gtc | acc | gag | ccc | gct | 288 |
| Gly | Asp | Val | Gln | Leu | Gly | Cys | Ile | Gly | Leu | Gly | Val | Thr | Glu | Pro | Ala | |
| | | | 85 | | | | | 90 | | | | | | 95 | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| caa | gcg | gca | gtt | atc | ggc | ggc | acg | ttc | tgg | caa | caa | gtg | gtg | aat | tta | 336 |
| Gln | Ala | Ala | Val | Ile | Gly | Gly | Thr | Phe | Trp | Gln | Gln | Val | Val | Asn | Leu | |
| | | | 100 | | | | | 105 | | | | | | 110 | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| ccg | cag | gcg | gtg | acc | gac | ccg | gaa | atg | aat | gta | cgt | att | aac | ccg | cac | 384 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|

Pro Gln Ala Val Thr Asp Pro Glu Met Asn Val Arg Ile Asn Pro His
115 120 125

gtt atc ccg ccg tta gta cag gcg gaa tcc att agc ttt ttc acc aga 432
Val Ile Pro Pro Leu Val Gln Ala Glu Ser Ile Ser Phe Phe Thr Arg
130 135 140

tta acc atg cgc tgg ttc cgt gat gca ttt tgc gaa gaa gaa aag aga 480
Leu Thr Met Arg Trp Phe Arg Asp Ala Phe Cys Glu Glu Glu Lys Arg
145 150 155 160

ctg gcg gaa aaa ctg ggt acc gat gct tat gcg ttg ctg gaa caa atg 528
Leu Ala Glu Lys Leu Gly Thr Asp Ala Tyr Ala Leu Leu Glu Gln Met
165 170 175

gcg gaa cgc gtg ccc gtc ggc gcc aat gacgt 560
Ala Glu Arg Val Pro Val Gly Ala Asn
180 185

<210> 2
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Ser Asp Trp Leu Ala Phe Met Leu Ser Gly Glu Leu Ala Val Glu Pro
1 5 10 15

Ser Asn Ala Gly Thr Thr Gly Met Leu Asn Leu Thr Thr Arg Gln Trp
20 25 30

Ser Pro Glu Leu Leu Asp Met Ala Gly Leu Asn Ser Asn Ile Leu Thr
35 40 45

Pro Ile Lys Glu Thr Gly Thr Arg Leu Gly Glu Val Thr Ser Glu Val
50 55 60

Ala Gln Gln Thr Gly Leu Ile Gln Gly Thr Pro Val Val Val Gly Gly
65 70 75 80

Gly Asp Val Gln Leu Gly Cys Ile Gly Leu Gly Val Thr Glu Pro Ala
85 90 95

Gln Ala Ala Val Ile Gly Gly Thr Phe Trp Gln Gln Val Val Asn Leu
100 105 110

Pro Gln Ala Val Thr Asp Pro Glu Met Asn Val Arg Ile Asn Pro His
115 120 125

Val Ile Pro Pro Leu Val Gln Ala Glu Ser Ile Ser Phe Phe Thr Arg
130 135 140

Leu Thr Met Arg Trp Phe Arg Asp Ala Phe Cys Glu Glu Glu Lys Arg
145 150 155 160

Leu Ala Glu Lys Leu Gly Thr Asp Ala Tyr Ala Leu Leu Glu Gln Met
165 170 175

Ala Glu Arg Val Pro Val Gly Ala Asn
180 185

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Cys Asp Thr Asp Ile Glu Arg Tyr Leu Asp Glu Gly Leu Ile Ser Leu
1 5 10 15

aat ccg cgc ccg tcg aac gat aaa att aat ggc gcc aca att gat gtg 96
Asn Pro Arg Pro Ser Asn Asp Lys Ile Asn Gly Ala Thr Ile Asp Val
20 25 30

cgt ttg ggc aat tcc ttc cgc gta ttt cgt gaa cat tcc gcc cct tac 144
Arg Leu Gly Asn Ser Phe Arg Val Phe Arg Glu His Ser Ala Pro Tyr
35 40 45

att gat ttg agc ggt ccg aaa gaa gaa gtg tcg gcg cag ttg gaa tcg 192
Ile Asp Leu Ser Gly Pro Lys Glu Glu Val Ser Ala Gln Leu Glu Ser
50 55 60

gtc atg agc gat gaa atg att atc ggt gat gac gaa gcc ttc ttt tta 240
Val Met Ser Asp Glu Met Ile Ile Gly Asp Asp Glu Ala Phe Phe Leu
65 70 75 80

cat ccc ggc gtg ctg gcg ctt gcc acg act ttg gaa tca gta aaa ctg 288
His Pro Gly Val Leu Ala Leu Ala Thr Thr Leu Glu Ser Val Lys Leu
85 90 95

ccg gcg aat att atc ggt tgg ctg gac ggg cgt tct tct ttg gcg cgt 336
Pro Ala Asn Ile Ile Gly Trp Leu Asp Gly Arg Ser Ser Leu Ala Arg
100 105 110

ttg ggg ttg atg gta cac gtc acc gcc cat cgt atc gac cca ggc tgg 384

| | |
|---|-----|
| Leu Gly Leu Met Val His Val Thr Ala His Arg Ile Asp Pro Gly Trp | |
| 115 120 125 | |
| gaa ggc aaa atc gtg ttg gaa ttt tac aat tcc ggc aaa tta ccg tta | 432 |
| Glu Gly Lys Ile Val Leu Glu Phe Tyr Asn Ser Gly Lys Leu Pro Leu | |
| 130 135 140 | |
| gcg tta cgc ccg aat atg att atc ggc gcc ttg agt ttc gaa gtg tta | 480 |
| Ala Leu Arg Pro Asn Met Ile Ile Gly Ala Leu Ser Phe Glu Val Leu | |
| 145 150 155 160 | |
| agc gga ccg gcg gcg cgt ccg tac agc agc cgc aaa gac gca aaa tac | 528 |
| Ser Gly Pro Ala Ala Arg Pro Tyr Ser Ser Arg Lys Asp Ala Lys Tyr | |
| 165 170 175 | |
| aag aac caa caa aat gcc gtt gcc agc cgc att gat gag gac aaa | 573 |
| Lys Asn Gln Gln Asn Ala Val Ala Ser Arg Ile Asp Glu Asp Lys | |
| 180 185 190 | |
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| <212> PRT | |
| <213> Actinobacillus actinomycetemcomitans | |
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| Cys Asp Thr Asp Ile Glu Arg Tyr Leu Asp Glu Gly Leu Ile Ser Leu | |
| 1 5 10 15 | |
| Asn Pro Arg Pro Ser Asn Asp Lys Ile Asn Gly Ala Thr Ile Asp Val | |
| 20 25 30 | |
| Arg Leu Gly Asn Ser Phe Arg Val Phe Arg Glu His Ser Ala Pro Tyr | |
| 35 40 45 | |
| Ile Asp Leu Ser Gly Pro Lys Glu Glu Val Ser Ala Gln Leu Glu Ser | |
| 50 55 60 | |
| Val Met Ser Asp Glu Met Ile Ile Gly Asp Asp Glu Ala Phe Phe Leu | |
| 65 70 75 80 | |
| His Pro Gly Val Leu Ala Leu Ala Thr Thr Leu Glu Ser Val Lys Leu | |
| 85 90 95 | |
| Pro Ala Asn Ile Ile Gly Trp Leu Asp Gly Arg Ser Ser Leu Ala Arg | |
| 100 105 110 | |
| Leu Gly Leu Met Val His Val Thr Ala His Arg Ile Asp Pro Gly Trp | |
| 115 120 125 | |

Glu Gly Lys Ile Val Leu Glu Phe Tyr Asn Ser Gly Lys Leu Pro Leu
 130 135 140

Ala Leu Arg Pro Asn Met Ile Ile Gly Ala Leu Ser Phe Glu Val Leu
 145 150 155 160

Ser Gly Pro Ala Ala Arg Pro Tyr Ser Ser Arg Lys Asp Ala Lys Tyr
 165 170 175

Lys Asn Gln Gln Asn Ala Val Ala Ser Arg Ile Asp Glu Asp Lys
 180 185 190

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 Met Asn Ala Ile Gln Pro Glu Asp Lys Ser Phe Trp Leu Phe Thr Gln
 1 5 10 15
 aga tca aaa ata cat tta att gac ggc aag ctt cct ttc ggc aat gcc 96
 Arg Ser Lys Ile His Leu Ile Asp Gly Lys Leu Pro Phe Gly Asn Ala
 20 25 30
 acc gaa ctg ggt ttc gtc ggg ctt cat gct atg cgc atc ggc gaa tgg 144
 Thr Glu Leu Gly Phe Val Gly Leu His Ala Met Arg Ile Gly Glu Trp
 35 40 45
 ctg gag caa ccg tta tat ttg gtg gaa acc caa ccg aac gac aac cgc 192
 Leu Glu Gln Pro Leu Tyr Leu Val Glu Thr Gln Pro Asn Asp Asn Arg
 50 55 60
 acc tat ttt tct tta cgc gat caa ctg ccg ctg ccg caa gcg caa ttt 240
 Thr Tyr Phe Ser Leu Arg Asp Gln Leu Pro Leu Pro Gln Ala Gln Phe
 65 70 75 80
 aat ctg ttg agc tgc ggc gtg gag tta aat cat ttc tat cag acc cat 288
 Asn Leu Leu Ser Cys Gly Val Glu Leu Asn His Phe Tyr Gln Thr His
 85 90 95
 caa ttc tgc gga aag tgc ggt gga aaa acc gag caa atg cag gag gaa 336
 Gln Phe Cys Gly Lys Cys Gly Gly Lys Thr Glu Gln Met Gln Glu Glu
 100 105 110
 tgg gcg gta aaa tgc cgt gcc tgc ggt ttt cat acc tat ccc gtc att 384

Leu Glu Gln Pro Leu Tyr Leu Val Glu Thr Gln Pro Asn Asp Asn Arg
 50 55 60

Thr Tyr Phe Ser Leu Arg Asp Gln Leu Pro Leu Pro Gln Ala Gln Phe
 65 70 75 80

Asn Leu Leu Ser Cys Gly Val Glu Leu Asn His Phe Tyr Gln Thr His
 85 90 95

Gln Phe Cys Gly Lys Cys Gly Gly Lys Thr Glu Gln Met Gln Glu Glu
 100 105 110

Trp Ala Val Lys Cys Arg Ala Cys Gly Phe His Thr Tyr Pro Val Ile
 115 120 125

Cys Pro Ser Ile Ile Val Ala Val Arg His Asp Ser Gln Ile Leu Leu
 130 135 140

Ala Asn His Met Arg His Lys Gly Gly Ile Tyr Thr Thr Leu Ala Gly
 145 150 155 160

Phe Val Glu Val Gly Glu Thr Phe Glu Asp Ala Val His Arg Glu Ile
 165 170 175

Trp Glu Glu Thr Gln Ile Lys Val Lys Asn Leu Arg Tyr Phe Asp Ser
 180 185 190

Gln Pro Trp Ala Phe Pro Asn Ser Gln Met Val Gly Phe Leu Ala Asp
 195 200 205

Tyr Glu Gly Gly Glu Ile Thr Ile Gln Arg Glu Glu Leu Tyr Asp Ala
 210 215 220

Gln Trp Phe Asp Cys Asp Gln Pro Leu Pro Glu Leu Pro Pro His Gly
 225 230 235 240

Thr Ile Ala Arg Lys Leu Ile Glu Thr Thr Leu Glu Leu Cys Lys Gln
 245 250 255

His Lys Ile Asn His Asn Lys Glu Arg Ala
 260 265

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| Lys Ile Gln Ser Leu Leu His Pro Asp Val Lys Pro Met Val Leu Pro | |
| 1 5 10 15 | |
| aac ccg att tcc gtt gaa atg tcc gcc atg cgt gtt tca tta ttg acc | 96 |
| Asn Pro Ile Ser Val Glu Met Ser Ala Met Arg Val Ser Leu Leu Thr | |
| 20 25 30 | |
| ggg tta ttg ggc gca gtg att tat aat caa aac cgc caa caa agt cgc | 144 |
| Gly Leu Leu Gly Ala Val Ile Tyr Asn Gln Asn Arg Gln Gln Ser Arg | |
| 35 40 45 | |
| gtg cgt ttg ttt gag cac ggt tta cgt ttt att ccg gac gaa aag gcc | 192 |
| Val Arg Leu Phe Glu His Gly Leu Arg Phe Ile Pro Asp Glu Lys Ala | |
| 50 55 60 | |
| gaa ttc ggc gtg cac caa gag ccg gtt ttt gcc gcg gtg atg aca ggg | 240 |
| Glu Phe Gly Val His Gln Glu Pro Val Phe Ala Ala Val Met Thr Gly | |
| 65 70 75 80 | |
| tta aaa tca aac gaa cag tgg agc gaa aaa gcc gta ccg gca gat ttt | 288 |
| Leu Lys Ser Asn Glu Gln Trp Ser Glu Lys Ala Val Pro Ala Asp Phe | |
| 85 90 95 | |
| tac gac tta aaa ggc tac att gaa aac tta ctt tcg tta agt tct gct | 336 |
| Tyr Asp Leu Lys Gly Tyr Ile Glu Asn Leu Leu Ser Leu Ser Ser Ala | |
| 100 105 110 | |
| gga aat cgg gca aaa ttt gta gca aaa tca tac aca gca ttg cat ccg | 384 |
| Gly Asn Arg Ala Lys Phe Val Ala Lys Ser Tyr Thr Ala Leu His Pro | |
| 115 120 125 | |
| ggg caa tct gcg gcc att atg ctg gat ggt gaa gaa atc gga ttt att | 432 |
| Gly Gln Ser Ala Ala Ile Met Leu Asp Gly Glu Glu Ile Gly Phe Ile | |
| 130 135 140 | |
| ggg caa ctt cac ccg act atc gcg caa aaa att ggt ctt acc gga aaa | 480 |
| Gly Gln Leu His Pro Thr Ile Ala Gln Lys Ile Gly Leu Thr Gly Lys | |
| 145 150 155 160 | |
| gca ttt gtt tgt gaa att tcg gtc gca cac att tct cga cga gaa gtc | 528 |
| Ala Phe Val Cys Glu Ile Ser Val Ala His Ile Ser Arg Arg Glu Val | |
| 165 170 175 | |
| gcc cgt gcc aaa gaa att tcc cgt ttc cct gct aat cgt cgt gat ttg | 576 |
| Ala Arg Ala Lys Glu Ile Ser Arg Phe Pro Ala Asn Arg Arg Asp Leu | |

| 180 | 185 | 190 | |
|---|--------------------------------------|-----|-----|
| gcg gtt gtg gtt gcg gat aat atc cct gca aat gac gtg ctg gaa gtg | | | 624 |
| Ala Val Val Val Ala Asp Asn Ile Pro Ala Asn Asp Val Leu Glu Val | | | |
| 195 | 200 | 205 | |
| tgt cgt aca gca ggc gga gat aaa tta acc caa atc aat tta ttt gat | | | 672 |
| Cys Arg Thr Ala Gly Gly Asp Lys Leu Thr Gln Ile Asn Leu Phe Asp | | | |
| 210 | 215 | 220 | |
| gtt tac cac gga acc ggt gtt gct gca ggg cat aag agc tta gct atc | | | 720 |
| Val Tyr His Gly Thr Gly Val Ala Ala Gly His Lys Ser Leu Ala Ile | | | |
| 225 | 230 | 235 | 240 |
| agc tta gta att caa gat aat gaa aaa acc ctt gaa gaa gat gaa att | | | 768 |
| Ser Leu Val Ile Gln Asp Asn Glu Lys Thr Leu Glu Glu Asp Glu Ile | | | |
| 245 | 250 | 255 | |
| aa | | | 770 |
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| <400> | 8 | | |
| Lys Ile Gln Ser Leu Leu His Pro Asp Val Lys Pro Met Val Leu Pro | | | |
| 1 | 5 | 10 | 15 |
| Asn Pro Ile Ser Val Glu Met Ser Ala Met Arg Val Ser Leu Leu Thr | | | |
| 20 | 25 | 30 | |
| Gly Leu Leu Gly Ala Val Ile Tyr Asn Gln Asn Arg Gln Gln Ser Arg | | | |
| 35 | 40 | 45 | |
| Val Arg Leu Phe Glu His Gly Leu Arg Phe Ile Pro Asp Glu Lys Ala | | | |
| 50 | 55 | 60 | |
| Glu Phe Gly Val His Gln Glu Pro Val Phe Ala Ala Val Met Thr Gly | | | |
| 65 | 70 | 75 | 80 |
| Leu Lys Ser Asn Glu Gln Trp Ser Glu Lys Ala Val Pro Ala Asp Phe | | | |
| 85 | 90 | 95 | |
| Tyr Asp Leu Lys Gly Tyr Ile Glu Asn Leu Leu Ser Leu Ser Ser Ala | | | |
| 100 | 105 | 110 | |
| Gly Asn Arg Ala Lys Phe Val Ala Lys Ser Tyr Thr Ala Leu His Pro | | | |

115

120

125

Gly Gln Ser Ala Ala Ile Met Leu Asp Gly Glu Glu Ile Gly Phe Ile
 130 135 140

Gly Gln Leu His Pro Thr Ile Ala Gln Lys Ile Gly Leu Thr Gly Lys
 145 150 155 160

Ala Phe Val Cys Glu Ile Ser Val Ala His Ile Ser Arg Arg Glu Val
 165 170 175

Ala Arg Ala Lys Glu Ile Ser Arg Phe Pro Ala Asn Arg Arg Asp Leu
 180 185 190

Ala Val Val Val Ala Asp Asn Ile Pro Ala Asn Asp Val Leu Glu Val
 195 200 205

Cys Arg Thr Ala Gly Gly Asp Lys Leu Thr Gln Ile Asn Leu Phe Asp
 210 215 220

Val Tyr His Gly Thr Gly Val Ala Ala Gly His Lys Ser Leu Ala Ile
 225 230 235 240

Ser Leu Val Ile Gln Asp Asn Glu Lys Thr Leu Glu Glu Asp Glu Ile
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tct ccc ttc gca ttg ctt gat gaa tta caa cgt att gaa cag gaa caa 96
 Ser Pro Phe Ala Leu Leu Asp Glu Leu Gln Arg Ile Glu Gln Glu Gln
 20 25 30

ggg cgt gtc cgt ctt cgt cgt tgg ggt gag cgc aca tta gat ctg 141
 Gly Arg Val Arg Leu Arg Arg Trp Gly Glu Arg Thr Leu Asp Leu
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Asp Gln Pro Asp Tyr Val Asn Ala Val Ala Cys Leu Glu Thr Ala Leu
 1 5 10 15

Ser Pro Phe Ala Leu Leu Asp Glu Leu Gln Arg Ile Glu Gln Glu Gln
 20 25 30

Gly Arg Val Arg Leu Arg Arg Trp Gly Glu Arg Thr Leu Asp Leu
 35 40 45

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 1 5 10 15

act atg cat att tcc gaa gat ggc gtg ata acc gat aaa acc gct caa 96
 Thr Met His Ile Ser Glu Asp Gly Val Ile Thr Asp Lys Thr Ala Gln
 20 25 30

cag ctt aat ccg gct agg tat gcc gga gct gtg tac aaa caa caa ttt 144
 Gln Leu Asn Pro Ala Arg Tyr Ala Gly Ala Val Tyr Lys Gln Gln Phe
 35 40 45

tct ttt tct gac agc ggc ggg caa ggt aaa acc act tac att aat caa 192
 Ser Phe Ser Asp Ser Gly Gly Gln Gly Lys Thr Thr Tyr Ile Asn Gln
 50 55 60

aat aac ggc aag aaa ttc gat cct aaa aat gct gct gat gtg agt gaa 240
 Asn Asn Gly Lys Lys Phe Asp Pro Lys Asn Ala Ala Asp Val Ser Glu
 65 70 75 80

ttg ggt aaa agc atc gcc ttt gaa gtg ttt gag att aaa gaa aat aaa 288
 Leu Gly Lys Ser Ile Ala Phe Glu Val Phe Glu Ile Lys Glu Asn Lys
 85 90 95

gac tct cac tca gta ttt gaa tcc ggc gcc ggc att tgt tac ggc ttc 336
 Asp Ser His Ser Val Phe Glu Ser Gly Ala Gly Ile Cys Tyr Gly Phe
 100 105 110

| | |
|---|-----|
| aaa tat acc gat ggc gtc gcg ttc acc gat tct aca acc tat tat gta | 384 |
| Lys Tyr Thr Asp Gly Val Ala Phe Thr Asp Ser Thr Thr Tyr Tyr Val | |
| 115 120 125 | |

| | |
|---|-----|
| gat aaa tcc aag cag caa tat tac gcc agt atc atc ggc gcc acc gta | 432 |
| Asp Lys Ser Lys Gln Gln Tyr Tyr Ala Ser Ile Ile Gly Ala Thr Val | |
| 130 135 140 | |

| | |
|---|-----|
| tct tct gac gtg gaa ccg aaa aac gtg caa tat gcg ccg gtg ttt aat | 480 |
| Ser Ser Asp Val Glu Pro Lys Asn Val Gln Tyr Ala Pro Val Phe Asn | |
| 145 150 155 160 | |

| | |
|---|-----|
| att cag gat ccc gag tta gat aaa gaa gta aag tcg gaa gaa caa cga | 528 |
| Ile Gln Asp Pro Glu Leu Asp Lys Glu Val Lys Ser Glu Glu Gln Arg | |
| 165 170 175 | |

| | |
|---|-----|
| aac ggt aaa acc ttg att aat aaa aat ttg caa aag agc aga gaa att | 576 |
| Asn Gly Lys Thr Leu Ile Asn Lys Asn Leu Gln Lys Ser Arg Glu Ile | |
| 180 185 190 | |

| | |
|-----------------------------|-----|
| ctt tct aac gta gtt tgt aag | 597 |
| Leu Ser Asn Val Val Cys Lys | |
| 195 | |

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| Gly Leu Ser Phe Thr Phe Leu Ser Ser Leu Ala Phe Ala Glu Ser Trp |
| 1 5 10 15 |

| |
|---|
| Thr Met His Ile Ser Glu Asp Gly Val Ile Thr Asp Lys Thr Ala Gln |
| 20 25 30 |

| |
|---|
| Gln Leu Asn Pro Ala Arg Tyr Ala Gly Ala Val Tyr Lys Gln Gln Phe |
| 35 40 45 |

| |
|---|
| Ser Phe Ser Asp Ser Gly Gly Gln Gly Lys Thr Thr Tyr Ile Asn Gln |
| 50 55 60 |

| |
|---|
| Asn Asn Gly Lys Lys Phe Asp Pro Lys Asn Ala Ala Asp Val Ser Glu |
| 65 70 75 80 |

| |
|---|
| Leu Gly Lys Ser Ile Ala Phe Glu Val Phe Glu Ile Lys Glu Asn Lys |
| 85 90 95 |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| aga | ctg | gtt | gtg | aca | ccg | agc | att | ggc | tat | tat | cgc | ggg | tgg | cac | tgg | 288 |
| Arg | Leu | Val | Val | Thr | Pro | Ser | Ile | Gly | Tyr | Tyr | Arg | Gly | Trp | His | Trp | |
| | | | | 85 | | | | 90 | | | | | | 95 | | |

<210> 14
 <211> 96
 <212> PRT
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 <400> 14

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|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Gln | Lys | Leu | Leu | Leu | Val | Thr | Val | Ile | Ser | Gly | Val | Leu | Val | Ala |
| 1 | | | 5 | | | | | | 10 | | | | | 15 | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Cys | Ser | Ser | Lys | Ala | Pro | Gln | Ile | Asn | Gln | Ala | Pro | Leu | Asp | Lys | Gln |
| | | | 20 | | | | | 25 | | | | | 30 | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Thr | Val | Glu | Ala | Tyr | Gln | Ala | Lys | Val | Tyr | Ser | Gly | Asn | Thr | Val | Ser |
| | | 35 | | | | | 40 | | | | | 45 | | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Lys | Lys | Tyr | Gln | Val | Arg | Asp | Val | Lys | Pro | Glu | Asp | Asn | Val | Leu | Asn |
| | 50 | | | | | 55 | | | | | 60 | | | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ala | Ser | Asp | Ser | Glu | Pro | Lys | Thr | Val | Ile | Tyr | Arg | Glu | Arg | Gln | Pro |
| 65 | | | | | 70 | | | | | 75 | | | | | 80 |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Arg | Leu | Val | Val | Thr | Pro | Ser | Ile | Gly | Tyr | Tyr | Arg | Gly | Trp | His | Trp |
| | | | | 85 | | | | 90 | | | | | | 95 | |

<210> 15
 <211> 403
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1) .. (402)

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|
| cca | aac | tgg | ttg | cgc | cgg | caa | gtc | ggg | gtc | gtc | ttg | caa | gat | aat | gtg | 48 |
| Pro | Asn | Trp | Leu | Arg | Arg | Gln | Val | Gly | Val | Val | Leu | Gln | Asp | Asn | Val | |
| 1 | | | | 5 | | | | 10 | | | | | | 15 | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|
| ttg | ctt | aat | cga | agt | atc | aga | gag | aat | att | gcg | tta | acc | aat | ccg | gga | 96 |
| Leu | Leu | Asn | Arg | Ser | Ile | Arg | Glu | Asn | Ile | Ala | Leu | Thr | Asn | Pro | Gly | |
| | | | 20 | | | | | 25 | | | | | 30 | | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| atg | cca | atg | gaa | aag | gtt | att | gcc | gcg | gca | aaa | ctt | gcg | gga | gcg | cac | 144 |
| Met | Pro | Met | Glu | Lys | Val | Ile | Ala | Ala | Ala | Lys | Leu | Ala | Gly | Ala | His | |

| 35 | 40 | 45 | |
|---|-----|-----|-----|
| gat ttt att tct gaa tta aga gaa ggt tat aac acg gtt gtg ggg gaa | | | 192 |
| Asp Phe Ile Ser Glu Leu Arg Glu Gly Tyr Asn Thr Val Val Gly Glu | | | |
| 50 | 55 | 60 | |
| cag gga gcc ggt ttg tcc gga gga caa cgt caa cgg atc gcg ata gca | | | 240 |
| Gln Gly Ala Gly Leu Ser Gly Gly Gln Arg Gln Arg Ile Ala Ile Ala | | | |
| 65 | 70 | 75 | 80 |
| agg gca cta gtc aat aac cca agg att ttg att ttt gat gaa gca acc | | | 288 |
| Arg Ala Leu Val Asn Asn Pro Arg Ile Leu Ile Phe Asp Glu Ala Thr | | | |
| | 85 | 90 | 95 |
| agt gca ctt gat tac gaa tct gaa aat atc att atg cat aat atg cat | | | 336 |
| Ser Ala Leu Asp Tyr Glu Ser Glu Asn Ile Ile Met His Asn Met His | | | |
| 100 | 105 | 110 | |
| aaa att tgc caa aat cgt act gtg ctt atc att gct cac cgc ctt tct | | | 384 |
| Lys Ile Cys Gln Asn Arg Thr Val Leu Ile Ile Ala His Arg Leu Ser | | | |
| 115 | 120 | 125 | |
| act gta aaa aat gct gat c | | | 403 |
| Thr Val Lys Asn Ala Asp | | | |
| 130 | | | |

<210> 16
 <211> 134
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans
 <400> 16

| | | | |
|---|----|----|----|
| Pro Asn Trp Leu Arg Arg Gln Val Gly Val Val Leu Gln Asp Asn Val | | | |
| 1 | 5 | 10 | 15 |
| Leu Leu Asn Arg Ser Ile Arg Glu Asn Ile Ala Leu Thr Asn Pro Gly | | | |
| 20 | 25 | 30 | |
| Met Pro Met Glu Lys Val Ile Ala Ala Ala Lys Leu Ala Gly Ala His | | | |
| 35 | 40 | 45 | |
| Asp Phe Ile Ser Glu Leu Arg Glu Gly Tyr Asn Thr Val Val Gly Glu | | | |
| 50 | 55 | 60 | |
| Gln Gly Ala Gly Leu Ser Gly Gly Gln Arg Gln Arg Ile Ala Ile Ala | | | |
| 65 | 70 | 75 | 80 |
| Arg Ala Leu Val Asn Asn Pro Arg Ile Leu Ile Phe Asp Glu Ala Thr | | | |
| 85 | 90 | 95 | |

Ser Ala Leu Asp Tyr Glu Ser Glu Asn Ile Ile Met His Asn Met His
 100 105 110

Lys Ile Cys Gln Asn Arg Thr Val Leu Ile Ile Ala His Arg Leu Ser
 115 120 125

Thr Val Lys Asn Ala Asp
 130

<210> 17
 <211> 374
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1) .. (372)

<400> 17
 cac cgt tta ccg gaa atg att aac caa att cgc ggt ggc aaa agt gct 48
 His Arg Leu Pro Glu Met Ile Asn Gln Ile Arg Gly Gly Lys Ser Ala
 1 5 10 15
 gtg gtg gat att agt ttc ccg gaa atc gaa aaa ttc gac cgg ttg ccg 96
 Val Val Asp Ile Ser Phe Pro Glu Ile Glu Lys Phe Asp Arg Leu Pro
 20 25 30
 gaa ccg cgc gca gaa ggc ccg act gcc ttt gtt tct atc atg gaa ggc 144
 Glu Pro Arg Ala Glu Gly Pro Thr Ala Phe Val Ser Ile Met Glu Gly
 35 40 45
 tgt aat aaa tac tgt act tac tgc gtg gtg cct tat acc cgt ggc gag 192
 Cys Asn Lys Tyr Cys Thr Tyr Cys Val Val Pro Tyr Thr Arg Gly Glu
 50 55 60
 gaa gtt agc cgt ccg gtg gat gat att tta ttt gaa att gcc cag ttg 240
 Glu Val Ser Arg Pro Val Asp Asp Ile Leu Phe Glu Ile Ala Gln Leu
 65 70 75 80
 gcg gag caa ggc gtg cgc gaa gtg aat ttg ctc ggc cag aac gtg aac 288
 Ala Glu Gln Gly Val Arg Glu Val Asn Leu Leu Gly Gln Asn Val Asn
 85 90 95
 gcc tat cgt ggt ccg aca ttt gat ggc gat att tgc acc ttc gcc gaa 336
 Ala Tyr Arg Gly Pro Thr Phe Asp Gly Asp Ile Cys Thr Phe Ala Glu
 100 105 110
 ttg ttg cgt ttg gta gcg gcc att gac ggt atc gat cg 374
 Leu Leu Arg Leu Val Ala Ala Ile Asp Gly Ile Asp
 115 120

<210> 18

<211> 124
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 18

His Arg Leu Pro Glu Met Ile Asn Gln Ile Arg Gly Gly Lys Ser Ala
 1 5 10 15

Val Val Asp Ile Ser Phe Pro Glu Ile Glu Lys Phe Asp Arg Leu Pro
 20 25 30

Glu Pro Arg Ala Glu Gly Pro Thr Ala Phe Val Ser Ile Met Glu Gly
 35 40 45

Cys Asn Lys Tyr Cys Thr Tyr Cys Val Val Pro Tyr Thr Arg Gly Glu
 50 55 60

Glu Val Ser Arg Pro Val Asp Asp Ile Leu Phe Glu Ile Ala Gln Leu
 65 70 75 80

Ala Glu Gln Gly Val Arg Glu Val Asn Leu Leu Gly Gln Asn Val Asn
 85 90 95

Ala Tyr Arg Gly Pro Thr Phe Asp Gly Asp Ile Cys Thr Phe Ala Glu
 100 105 110

Leu Leu Arg Leu Val Ala Ala Ile Asp Gly Ile Asp
 115 120

<210> 19
 <211> 158
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1) .. (156)

<400> 19

cta agc gta ttc aac tac gcc cat ttg ccg agc cgt ttt gcc gga cag 48
 Leu Ser Val Phe Asn Tyr Ala His Leu Pro Ser Arg Phe Ala Gly Gln
 1 5 10 15

gcg aaa atc aag gat tgg cag ttg ccg aaa ccg gaa gcg aaa ctg gaa 96
 Ala Lys Ile Lys Asp Trp Gln Leu Pro Lys Pro Glu Ala Lys Leu Glu
 20 25 30

att ctg caa aaa acc atc gaa acg ctg ggc aac gcc ggt tac aaa ttt 144

Ile Leu Gln Lys Thr Ile Glu Thr Leu Gly Asn Ala Gly Tyr Lys Phe
 35 40 45

atc ggc atg gat ca
 Ile Gly Met Asp
 50

158

<210> 20
 <211> 52
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 20

Leu Ser Val Phe Asn Tyr Ala His Leu Pro Ser Arg Phe Ala Gly Gln
 1 5 10 15

Ala Lys Ile Lys Asp Trp Gln Leu Pro Lys Pro Glu Ala Lys Leu Glu
 20 25 30

Ile Leu Gln Lys Thr Ile Glu Thr Leu Gly Asn Ala Gly Tyr Lys Phe
 35 40 45

Ile Gly Met Asp
 50

<210> 21
 <211> 1098
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1)..(1095)

<400> 21

aat cag atg aat aaa acc tta aaa att tca ttg ttt gcc atg att tcc
 Asn Gln Met Asn Lys Thr Leu Lys Ile Ser Leu Phe Ala Met Ile Ser
 1 5 10 15

48

gcg tta gct ttt aat acc atg gca aat aca caa ccg tta gcc gtg ttg
 Ala Leu Ala Phe Asn Thr Met Ala Asn Thr Gln Pro Leu Ala Val Leu
 20 25 30

96

gaa ccg cag gta aac tat caa cag tta ctc acc caa cgg cag gtg gtg
 Glu Pro Gln Val Asn Tyr Gln Gln Leu Leu Thr Gln Arg Gln Val Val
 35 40 45

144

gat gat tta atc gcg cag gcg gtg aaa atc caa aat tca ccg gcg cgg
 Asp Asp Leu Ile Ala Gln Ala Val Lys Ile Gln Asn Ser Pro Ala Arg
 50 55 60

192

| | |
|---|-----|
| gtg tcc aat gcg ggc ttt acc gca aaa ttg cca agc aac atg gaa cgc | 240 |
| Val Ser Asn Ala Gly Phe Thr Ala Lys Leu Pro Ser Asn Met Glu Arg | |
| 65 70 75 80 | |
| att gcc gcg att ttg ttg gaa gcc tat gaa ttg gaa cct tac cgc gtt | 288 |
| Ile Ala Ala Ile Leu Leu Glu Ala Tyr Glu Leu Glu Pro Tyr Arg Val | |
| 85 90 95 | |
| gat ttt ctg ttc ggc gca gca aat gcc aac att tac aac ggc aat acg | 336 |
| Asp Phe Leu Phe Gly Ala Ala Asn Ala Asn Ile Tyr Asn Gly Asn Thr | |
| 100 105 110 | |
| gac aaa gcc atc gag ctt tac caa aaa gtg ctc acg gtg gcg cct gat | 384 |
| Asp Lys Ala Ile Glu Leu Tyr Gln Lys Val Leu Thr Val Ala Pro Asp | |
| 115 120 125 | |
| gat gtg aaa gca cat att tat tta acc gcg tgg aat cgt ttt aaa caa | 432 |
| Asp Val Lys Ala His Ile Tyr Leu Thr Ala Trp Asn Arg Phe Lys Gln | |
| 130 135 140 | |
| aac caa ggg gaa acc gac aaa tac ttc acc cgc tta aaa gcg ctg gca | 480 |
| Asn Gln Gly Glu Thr Asp Lys Tyr Phe Thr Arg Leu Lys Ala Leu Ala | |
| 145 150 155 160 | |
| ccg caa aaa gca gcg gaa ctg gag cag gtc ttc aag att att gat aac | 528 |
| Pro Gln Lys Ala Ala Glu Leu Glu Gln Val Phe Lys Ile Ile Asp Asn | |
| 165 170 175 | |
| gcc gca agc caa ccg att agc gat aaa ttg gcg aat aaa ttg ccg gcg | 576 |
| Ala Ala Ser Gln Pro Ile Ser Asp Lys Leu Ala Asn Lys Leu Pro Ala | |
| 180 185 190 | |
| gat tcc gcc att att acc ttg ggt tat gcg tta aat ccg gac ggc agt | 624 |
| Asp Ser Ala Ile Ile Thr Leu Gly Tyr Ala Leu Asn Pro Asp Gly Ser | |
| 195 200 205 | |
| atg cac gac att ttg att cag cgt ttg gaa aaa acc ttg gaa atc gcc | 672 |
| Met His Asp Ile Leu Ile Gln Arg Leu Glu Lys Thr Leu Glu Ile Ala | |
| 210 215 220 | |
| aaa caa aat cct gat gca ttg att att gtc acc ggc ggc atg ccg caa | 720 |
| Lys Gln Asn Pro Asp Ala Leu Ile Ile Val Thr Gly Gly Met Pro Gln | |
| 225 230 235 240 | |
| aat aat cgt acg gaa ggg gca tta atg aaa caa tgg ctg att aac aaa | 768 |
| Asn Asn Arg Thr Glu Gly Ala Leu Met Lys Gln Trp Leu Ile Asn Lys | |
| 245 250 255 | |
| ggc atc gat gcc aaa cgc att tat gcc gac aat tac gcc cgt tca acg | 816 |
| Gly Ile Asp Ala Lys Arg Ile Tyr Ala Asp Asn Tyr Ala Arg Ser Thr | |
| 260 265 270 | |
| gtg gaa aat gcg tta ttt tcc cgt tac gcc ttg gcg aaa cac cat atc | 864 |
| Val Glu Asn Ala Leu Phe Ser Arg Tyr Ala Leu Ala Lys His His Ile | |
| 275 280 285 | |
| aaa cac gcc tcc ctc atc agc tcc ggt agc cat gtg cgg cgc ggt cag | 912 |

Lys His Ala Ser Leu Ile Ser Ser Gly Ser His Val Arg Arg Gly Gln
 290 295 300

gcg ttg ttt gaa atc gcc gcc ttg gaa tcc ggt ccg caa aac atc aaa 960
 Ala Leu Phe Glu Ile Ala Ala Leu Glu Ser Gly Pro Gln Asn Ile Lys
 305 310 315 320

atc gaa acg gtg gcg gcg cta gac aaa ccg tta gac gaa tta caa aaa 1008
 Ile Glu Thr Val Ala Ala Leu Asp Lys Pro Leu Asp Glu Leu Gln Lys
 325 330 335

gtg agt gaa aaa gat tta ttg gga atc tat cgc gac agc ctg aaa acc 1056
 Val Ser Glu Lys Asp Leu Leu Gly Ile Tyr Arg Asp Ser Leu Lys Thr
 340 345 350

atg ggc ttg cca atg ttt aat agc gga gca cta caa gat taa 1098
 Met Gly Leu Pro Met Phe Asn Ser Gly Ala Leu Gln Asp
 355 360 365

<210> 22
 <211> 365
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 22

Asn Gln Met Asn Lys Thr Leu Lys Ile Ser Leu Phe Ala Met Ile Ser
 1 5 10 15

Ala Leu Ala Phe Asn Thr Met Ala Asn Thr Gln Pro Leu Ala Val Leu
 20 25 30

Glu Pro Gln Val Asn Tyr Gln Gln Leu Leu Thr Gln Arg Gln Val Val
 35 40 45

Asp Asp Leu Ile Ala Gln Ala Val Lys Ile Gln Asn Ser Pro Ala Arg
 50 55 60

Val Ser Asn Ala Gly Phe Thr Ala Lys Leu Pro Ser Asn Met Glu Arg
 65 70 75 80

Ile Ala Ala Ile Leu Leu Glu Ala Tyr Glu Leu Glu Pro Tyr Arg Val
 85 90 95

Asp Phe Leu Phe Gly Ala Ala Asn Ala Asn Ile Tyr Asn Gly Asn Thr
 100 105 110

Asp Lys Ala Ile Glu Leu Tyr Gln Lys Val Leu Thr Val Ala Pro Asp
 115 120 125

Asp Val Lys Ala His Ile Tyr Leu Thr Ala Trp Asn Arg Phe Lys Gln
130 135 140

Asn Gln Gly Glu Thr Asp Lys Tyr Phe Thr Arg Leu Lys Ala Leu Ala
145 150 155 160

Pro Gln Lys Ala Ala Glu Leu Glu Gln Val Phe Lys Ile Ile Asp Asn
165 170 175

Ala Ala Ser Gln Pro Ile Ser Asp Lys Leu Ala Asn Lys Leu Pro Ala
180 185 190

Asp Ser Ala Ile Ile Thr Leu Gly Tyr Ala Leu Asn Pro Asp Gly Ser
195 200 205

Met His Asp Ile Leu Ile Gln Arg Leu Glu Lys Thr Leu Glu Ile Ala
210 215 220

Lys Gln Asn Pro Asp Ala Leu Ile Ile Val Thr Gly Gly Met Pro Gln
225 230 235 240

Asn Asn Arg Thr Glu Gly Ala Leu Met Lys Gln Trp Leu Ile Asn Lys
245 250 255

Gly Ile Asp Ala Lys Arg Ile Tyr Ala Asp Asn Tyr Ala Arg Ser Thr
260 265 270

Val Glu Asn Ala Leu Phe Ser Arg Tyr Ala Leu Ala Lys His His Ile
275 280 285

Lys His Ala Ser Leu Ile Ser Ser Gly Ser His Val Arg Arg Gly Gln
290 295 300

Ala Leu Phe Glu Ile Ala Ala Leu Glu Ser Gly Pro Gln Asn Ile Lys
305 310 315 320

Ile Glu Thr Val Ala Ala Leu Asp Lys Pro Leu Asp Glu Leu Gln Lys
325 330 335

Val Ser Glu Lys Asp Leu Leu Gly Ile Tyr Arg Asp Ser Leu Lys Thr
340 345 350

Met Gly Leu Pro Met Phe Asn Ser Gly Ala Leu Gln Asp
 355 360 365

<210> 23
 <211> 134
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1)..(132)

<400> 23
 ttg gat caa ttc ccg tcc gac gtt tat caa ggc ggc gcg ggc act tcc 48
 Leu Asp Gln Phe Pro Ser Asp Val Tyr Gln Gly Gly Ala Gly Thr Ser
 1 5 10 15
 gtc aac atg aat acg aac gaa gtg gtt gcg aat ctg gca ttg gaa att 96
 Val Asn Met Asn Thr Asn Glu Val Val Ala Asn Leu Ala Leu Glu Ile
 20 25 30
 tta gga cac aaa aaa ggc gaa tat aat tat ttg gat cc 134
 Leu Gly His Lys Lys Gly Glu Tyr Asn Tyr Leu Asp
 35 40

<210> 24
 <211> 44
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 24
 Leu Asp Gln Phe Pro Ser Asp Val Tyr Gln Gly Gly Ala Gly Thr Ser
 1 5 10 15
 Val Asn Met Asn Thr Asn Glu Val Val Ala Asn Leu Ala Leu Glu Ile
 20 25 30
 Leu Gly His Lys Lys Gly Glu Tyr Asn Tyr Leu Asp
 35 40

<210> 25
 <211> 380
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1)..(378)

<400> 25

gat ccg aac agc ttc aaa ctg cgc ggc gaa ttg agc cac ggc aaa gac 48
Asp Pro Asn Ser Phe Lys Leu Arg Gly Glu Leu Ser His Gly Lys Asp
1 5 10 15

gtg gaa atc gac atg aac gtg att tta aac ggc aaa gtg cgg tta gga 96
Val Glu Ile Asp Met Asn Val Ile Leu Asn Gly Lys Val Arg Leu Gly
20 25 30

aat cgg gtg aaa atc ggt gca ggt tgt gtg ttg act aac tgc gac atc 144
Asn Arg Val Lys Ile Gly Ala Gly Cys Val Leu Thr Asn Cys Asp Ile
35 40 45

ggc gat gac gtg gaa atc aaa ccg tat tcc gtg ctg gaa gat gcc tcc 192
Gly Asp Asp Val Glu Ile Lys Pro Tyr Ser Val Leu Glu Asp Ala Ser
50 55 60

gta ggc gcc aat gcc gcc atc gga ccg ttc tcc cgc tta cgt ccg ggc 240
Val Gly Ala Asn Ala Ala Ile Gly Pro Phe Ser Arg Leu Arg Pro Gly
65 70 75 80

gcc gac ttg gcg gaa aac acc cac gtg ggc aat ttc gtg gaa atc aaa 288
Ala Asp Leu Ala Glu Asn Thr His Val Gly Asn Phe Val Glu Ile Lys
85 90 95

aaa gcg tac atc ggc aaa ggc tcc aaa gtg aac cac tta acc tat gtg 336
Lys Ala Tyr Ile Gly Lys Gly Ser Lys Val Asn His Leu Thr Tyr Val
100 105 110

ggc gac gcg gaa atc ggc aaa gat tgt aac ata ggc gca ggc gt 380
Gly Asp Ala Glu Ile Gly Lys Asp Cys Asn Ile Gly Ala Gly
115 120 125

<210> 26
<211> 126
<212> PRT
<213> Actinobacillus actinomycetemcomitans

<400> 26

Asp Pro Asn Ser Phe Lys Leu Arg Gly Glu Leu Ser His Gly Lys Asp
1 5 10 15

Val Glu Ile Asp Met Asn Val Ile Leu Asn Gly Lys Val Arg Leu Gly
20 25 30

Asn Arg Val Lys Ile Gly Ala Gly Cys Val Leu Thr Asn Cys Asp Ile
35 40 45

Gly Asp Asp Val Glu Ile Lys Pro Tyr Ser Val Leu Glu Asp Ala Ser
50 55 60

Val Gly Ala Asn Ala Ala Ile Gly Pro Phe Ser Arg Leu Arg Pro Gly

65

70

75

80

Ala Asp Leu Ala Glu Asn Thr His Val Gly Asn Phe Val Glu Ile Lys
85 90 95

Lys Ala Tyr Ile Gly Lys Gly Ser Lys Val Asn His Leu Thr Tyr Val
100 105 110

Gly Asp Ala Glu Ile Gly Lys Asp Cys Asn Ile Gly Ala Gly
115 120 125

<210> 27

<211> 468

<212> DNA

<213> Actinobacillus actinomycetemcomitans

<220>

<221> CDS

<222> (1)..(468)

<400> 27

att ggt cgc caa ctt gct cag ttg ctc aac atg gat ttt gta gat acc 48
Ile Gly Arg Gln Leu Ala Gln Leu Leu Asn Met Asp Phe Val Asp Thr
1 5 10 15

gac gca gaa att gaa gaa cgc gcc ggc gca gat att ggc tgg att ttt 96
Asp Ala Glu Ile Glu Glu Arg Ala Gly Ala Asp Ile Gly Trp Ile Phe
20 25 30

gat gtt gag ggc gaa gcc ggt ttc cgt aaa aga gaa gaa cgt att att 144
Asp Val Glu Gly Glu Ala Gly Phe Arg Lys Arg Glu Glu Arg Ile Ile
35 40 45

aac gaa tta acg caa cgc caa ggc atc gtg tta tct acc ggc ggc ggt 192
Asn Glu Leu Thr Gln Arg Gln Gly Ile Val Leu Ser Thr Gly Gly Gly
50 55 60

gca gtg tta tct aag gac aat cga aac cag ctt gcc gcg cgc ggt att 240
Ala Val Leu Ser Lys Asp Asn Arg Asn Gln Leu Ala Ala Arg Gly Ile
65 70 75 80

gtg att tat ctg gaa acc act gtt gaa aag caa tat caa cgc acc cag 288
Val Ile Tyr Leu Glu Thr Thr Val Glu Lys Gln Tyr Gln Arg Thr Gln
85 90 95

cgg gat aaa aag cgc ccg ctt ttg caa gat gtt gcc gat ccg cgt cag 336
Arg Asp Lys Lys Arg Pro Leu Leu Gln Asp Val Ala Asp Pro Arg Gln
100 105 110

gtg ttg gaa gat ttg gcg aaa atc cgc aat ccg ctg tat gaa gac gta 384
Val Leu Glu Asp Leu Ala Lys Ile Arg Asn Pro Leu Tyr Glu Asp Val
115 120 125

gca gac att acc ctc cct act gat gac caa agt gcc aag gta atg gca 432
 Ala Asp Ile Thr Leu Pro Thr Asp Asp Gln Ser Ala Lys Val Met Ala
 130 135 140

acg cag att atc gac ttg att gat aac tat aac ggt 468
 Thr Gln Ile Ile Asp Leu Ile Asp Asn Tyr Asn Gly
 145 150 155

<210> 28
 <211> 156
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 28

Ile Gly Arg Gln Leu Ala Gln Leu Leu Asn Met Asp Phe Val Asp Thr
 1 5 10 15

Asp Ala Glu Ile Glu Glu Arg Ala Gly Ala Asp Ile Gly Trp Ile Phe
 20 25 30

Asp Val Glu Gly Glu Ala Gly Phe Arg Lys Arg Glu Glu Arg Ile Ile
 35 40 45

Asn Glu Leu Thr Gln Arg Gln Gly Ile Val Leu Ser Thr Gly Gly Gly
 50 55 60

Ala Val Leu Ser Lys Asp Asn Arg Asn Gln Leu Ala Ala Arg Gly Ile
 65 70 75 80

Val Ile Tyr Leu Glu Thr Thr Val Glu Lys Gln Tyr Gln Arg Thr Gln
 85 90 95

Arg Asp Lys Lys Arg Pro Leu Leu Gln Asp Val Ala Asp Pro Arg Gln
 100 105 110

Val Leu Glu Asp Leu Ala Lys Ile Arg Asn Pro Leu Tyr Glu Asp Val
 115 120 125

Ala Asp Ile Thr Leu Pro Thr Asp Asp Gln Ser Ala Lys Val Met Ala
 130 135 140

Thr Gln Ile Ile Asp Leu Ile Asp Asn Tyr Asn Gly
 145 150 155

<210> 29

<211> 307
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1)..(306)

<400> 29
 gcc tcc cgc agt ggc gat gcc gat gag cgt gtc atg gat tcc aac gat 48
 Ala Ser Arg Ser Gly Asp Ala Asp Glu Arg Val Met Asp Ser Asn Asp
 1 5 10 15
 tta gaa aaa gag cgc ggc atc act att tta gcg aaa aat act gcc att 96
 Leu Glu Lys Glu Arg Gly Ile Thr Ile Leu Ala Lys Asn Thr Ala Ile
 20 25 30
 aac tgg aat agc tac cgt att aac att gta gac acc ccg ggg cac gcg 144
 Asn Trp Asn Ser Tyr Arg Ile Asn Ile Val Asp Thr Pro Gly His Ala
 35 40 45
 gac ttc ggt ggc gaa gtg gaa cgc gta ctt tcc atg gtg gat tcc gta 192
 Asp Phe Gly Gly Glu Val Glu Arg Val Leu Ser Met Val Asp Ser Val
 50 55 60
 tta ttg atg gtg gat gcc ttc gac ggc ccg atg ccg caa acc cgt ttt 240
 Leu Leu Met Val Asp Ala Phe Asp Gly Pro Met Pro Gln Thr Arg Phe
 65 70 75 80
 gtt acg caa aaa gcc ttc tcc cac ggt tta aaa cct atc gta gtc atc 288
 Val Thr Gln Lys Ala Phe Ser His Gly Leu Lys Pro Ile Val Val Ile
 85 90 95
 aat aaa gtt gac cgc ccg g 307
 Asn Lys Val Asp Arg Pro
 100

<210> 30
 <211> 102
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 30
 Ala Ser Arg Ser Gly Asp Ala Asp Glu Arg Val Met Asp Ser Asn Asp
 1 5 10 15
 Leu Glu Lys Glu Arg Gly Ile Thr Ile Leu Ala Lys Asn Thr Ala Ile
 20 25 30
 Asn Trp Asn Ser Tyr Arg Ile Asn Ile Val Asp Thr Pro Gly His Ala
 35 40 45

Asp Phe Gly Gly Glu Val Glu Arg Val Leu Ser Met Val Asp Ser Val
50 55 60

Leu Leu Met Val Asp Ala Phe Asp Gly Pro Met Pro Gln Thr Arg Phe
65 70 75 80

Val Thr Gln Lys Ala Phe Ser His Gly Leu Lys Pro Ile Val Val Ile
85 90 95

Asn Lys Val Asp Arg Pro
100

<210> 31
<211> 891
<212> DNA
<213> Actinobacillus actinomycetemcomitans

<220>
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<220>
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<223> n is any nucleotide a, g, c, or t.

<220>
<221> misc_feature
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<223> n is any nucleotide a, g, c, or t.

<400> 31
atg gct atc gta caa tcc aaa tct gcc cgc tac cgt tta tgg gtg acc 48
Met Ala Ile Val Gln Ser Lys Ser Ala Arg Tyr Arg Leu Trp Val Thr
1 5 10 15

cat ttg ctg ctg att gca ttt att tgt ctg att att ttc ccg tta ctg 96
His Leu Leu Leu Ile Ala Phe Ile Cys Leu Ile Ile Phe Pro Leu Leu
20 25 30

atg gtg atc ggc att tcc ctg cgc ccg ggc aac ctc gct ttg ggc gat 144
Met Val Ile Gly Ile Ser Leu Arg Pro Gly Asn Leu Ala Leu Gly Asp
35 40 45

ttg att ccg aaa caa att tcc tgg gaa cac tgg cag gcg gcg ctt ggc 192
Leu Ile Pro Lys Gln Ile Ser Trp Glu His Trp Gln Ala Ala Leu Gly
50 55 60

ttt tat gtg gta cac gcc gac ggt tct gtc aca cca ccg ccg ttc ccg 240
Phe Tyr Val Val His Ala Asp Gly Ser Val Thr Pro Pro Pro Phe Pro
65 70 75 80

| | |
|---|-----|
| gtg ttg ttg tgg ttg tgg aac tcc att aaa gtg gcg acc atc acc tcc | 288 |
| Val Leu Leu Trp Leu Trp Asn Ser Ile Lys Val Ala Thr Ile Thr Ser | |
| 85 90 95 | |
| gtg ggt atc gtt gtt atg tcc acc act tgc gcc tac gct ttc gcg cgg | 336 |
| Val Gly Ile Val Val Met Ser Thr Thr Cys Ala Tyr Ala Phe Ala Arg | |
| 100 105 110 | |
| atg aaa ttc aaa ggc aaa aaa acc atc ttg caa ggc atg tta att ttc | 384 |
| Met Lys Phe Lys Gly Lys Lys Thr Ile Leu Gln Gly Met Leu Ile Phe | |
| 115 120 125 | |
| caa atg ttc cct gcg gtg ttg tct ttg gtc gcc tta tac gcc tta ttc | 432 |
| Gln Met Phe Pro Ala Val Leu Ser Leu Val Ala Leu Tyr Ala Leu Phe | |
| 130 135 140 | |
| gat cgc ctc ggt caa tat atc ccg ttc ctc ggc tta aac acc cac ggc | 480 |
| Asp Arg Leu Gly Gln Tyr Ile Pro Phe Leu Gly Leu Asn Thr His Gly | |
| 145 150 155 160 | |
| ggc gtg att ttc gct tac ttg ggc ggt atc gcc ttg cac gtt tgg acc | 528 |
| Gly Val Ile Phe Ala Tyr Leu Gly Gly Ile Ala Leu His Val Trp Thr | |
| 165 170 175 | |
| atc aaa ggc tat ttt gaa acc atc gac gga tcc ctg gaa gaa gct gcc | 576 |
| Ile Lys Gly Tyr Phe Glu Thr Ile Asp Gly Ser Leu Glu Glu Ala Ala | |
| 180 185 190 | |
| gcc tta gac ggc gct acc cca tgg cag gca ttc cgc tta att tta cta | 624 |
| Ala Leu Asp Gly Ala Thr Pro Trp Gln Ala Phe Arg Leu Ile Leu Leu | |
| 195 200 205 | |
| cct ctc tcc gta ccg att ctg gcg gtg gtc ttc att ctt tcc ttc atc | 672 |
| Pro Leu Ser Val Pro Ile Leu Ala Val Val Phe Ile Leu Ser Phe Ile | |
| 210 215 220 | |
| gcc gcc att acc gaa gtg ccg gtc gcc tcg cta tta tta cgc gat gtc | 720 |
| Ala Ala Ile Thr Glu Val Pro Val Ala Ser Leu Leu Leu Arg Asp Val | |
| 225 230 235 240 | |
| aac agc tac acc ctg gcg gtg gga atg caa caa tat ctc tac ccg caa | 768 |
| Asn Ser Tyr Thr Leu Ala Val Gly Met Gln Gln Tyr Leu Tyr Pro Gln | |
| 245 250 255 | |
| aac tac ctt tgg ggc gac ttc gcc gct gca gcg gtg ctt tcc gct att | 816 |
| Asn Tyr Leu Trp Gly Asp Phe Ala Ala Ala Ala Val Leu Ser Ala Ile | |
| 260 265 270 | |
| cct att acc ctc gtg ttc tta ctg gca caa cgc tgg tta atc ggc gga | 864 |
| Pro Ile Thr Leu Val Phe Leu Leu Ala Gln Arg Trp Leu Ile Gly Gly | |
| 275 280 285 | |
| tta acg gca ggt ggg gtn aar ggn tga | 891 |
| Leu Thr Ala Gly Gly Val Lys Gly | |
| 290 295 | |

<210> 32
 <211> 296
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> misc_feature
 <222> (182)..(182)
 <223> n is any nucleotide a, g, c, or t.

<220>
 <221> misc_feature
 <222> (188)..(188)
 <223> n is any nucleotide a, g, c, or t.

<400> 32

Met Ala Ile Val Gln Ser Lys Ser Ala Arg Tyr Arg Leu Trp Val Thr
 1 5 10 15

His Leu Leu Leu Ile Ala Phe Ile Cys Leu Ile Ile Phe Pro Leu Leu
 20 25 30

Met Val Ile Gly Ile Ser Leu Arg Pro Gly Asn Leu Ala Leu Gly Asp
 35 40 45

Leu Ile Pro Lys Gln Ile Ser Trp Glu His Trp Gln Ala Ala Leu Gly
 50 55 60

Phe Tyr Val Val His Ala Asp Gly Ser Val Thr Pro Pro Pro Phe Pro
 65 70 75 80

Val Leu Leu Trp Leu Trp Asn Ser Ile Lys Val Ala Thr Ile Thr Ser
 85 90 95

Val Gly Ile Val Val Met Ser Thr Thr Cys Ala Tyr Ala Phe Ala Arg
 100 105 110

Met Lys Phe Lys Gly Lys Lys Thr Ile Leu Gln Gly Met Leu Ile Phe
 115 120 125

Gln Met Phe Pro Ala Val Leu Ser Leu Val Ala Leu Tyr Ala Leu Phe
 130 135 140

Asp Arg Leu Gly Gln Tyr Ile Pro Phe Leu Gly Leu Asn Thr His Gly
 145 150 155 160

Gly Val Ile Phe Ala Tyr Leu Gly Gly Ile Ala Leu His Val Trp Thr
 165 170 175

Ile Lys Gly Tyr Phe Glu Thr Ile Asp Gly Ser Leu Glu Glu Ala Ala
 180 185 190

Ala Leu Asp Gly Ala Thr Pro Trp Gln Ala Phe Arg Leu Ile Leu Leu
 195 200 205

Pro Leu Ser Val Pro Ile Leu Ala Val Val Phe Ile Leu Ser Phe Ile
 210 215 220

Ala Ala Ile Thr Glu Val Pro Val Ala Ser Leu Leu Leu Arg Asp Val
 225 230 235 240

Asn Ser Tyr Thr Leu Ala Val Gly Met Gln Gln Tyr Leu Tyr Pro Gln
 245 250 255

Asn Tyr Leu Trp Gly Asp Phe Ala Ala Ala Ala Val Leu Ser Ala Ile
 260 265 270

Pro Ile Thr Leu Val Phe Leu Leu Ala Gln Arg Trp Leu Ile Gly Gly
 275 280 285

Leu Thr Ala Gly Gly Val Lys Gly
 290 295

<210> 33
 <211> 323
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1)..(321)

<400> 33
 aat gtt tat ggc ggt acc aaa gcc ttt gta aaa caa ttt agc tta aac 48
 Asn Val Tyr Gly Gly Thr Lys Ala Phe Val Lys Gln Phe Ser Leu Asn
 1 5 10 15

cta cgt gcc gat ctt gcc gga acc aat att cgc gtt tcc aat gta gaa 96
 Leu Arg Ala Asp Leu Ala Gly Thr Asn Ile Arg Val Ser Asn Val Glu
 20 25 30

ccg gga ctg tgc ggc ggc acg gaa ttt tct aac gta cgt ttt aaa ggc 144
 Pro Gly Leu Cys Gly Gly Thr Glu Phe Ser Asn Val Arg Phe Lys Gly

<213> Actinobacillus actinomycetemcomitans

<220>

<221> CDS

<222> (1)..(585)

<400> 35

| | |
|---|----|
| atg gcg gaa acg att tta aac ccg tat ttc ggg gaa ttc ggc gga atg | 48 |
| Met Ala Glu Thr Ile Leu Asn Pro Tyr Phe Gly Glu Phe Gly Gly Met | |
| 1 5 10 15 | |

| | |
|---|----|
| tat gtg ccg gaa att cta gtg ccg gtg ttg caa cag ttg gaa aaa gcg | 96 |
| Tyr Val Pro Glu Ile Leu Val Pro Val Leu Gln Gln Leu Glu Lys Ala | |
| 20 25 30 | |

| | |
|---|-----|
| ttt gta gaa gcc aag gcg gat cct gca ttt cag cgc gaa ttt cag gat | 144 |
| Phe Val Glu Ala Lys Ala Asp Pro Ala Phe Gln Arg Glu Phe Gln Asp | |
| 35 40 45 | |

| | |
|---|-----|
| tta ttg aaa aat tat gcc ggc aga ccc acc gca ctt acc ctt tgt cgc | 192 |
| Leu Leu Lys Asn Tyr Ala Gly Arg Pro Thr Ala Leu Thr Leu Cys Arg | |
| 50 55 60 | |

| | |
|---|-----|
| aat ctc acc aaa ggc acc aac gcc aaa atc tat tta aaa cgg gaa gat | 240 |
| Asn Leu Thr Lys Gly Thr Asn Ala Lys Ile Tyr Leu Lys Arg Glu Asp | |
| 65 70 75 80 | |

| | |
|---|-----|
| tta tta cac ggc ggc gca cat aaa acc aac cag gta tta ggt cag att | 288 |
| Leu Leu His Gly Gly Ala His Lys Thr Asn Gln Val Leu Gly Gln Ile | |
| 85 90 95 | |

| | |
|---|-----|
| ttg ctt gcc aaa cgc atg ggc aaa acc cgc att att gcc gaa acc ggc | 336 |
| Leu Leu Ala Lys Arg Met Gly Lys Thr Arg Ile Ile Ala Glu Thr Gly | |
| 100 105 110 | |

| | |
|---|-----|
| gcg gga cag cac ggt gtc gcc act gct ctc gcc tgc gcc atg ttg gat | 384 |
| Ala Gly Gln His Gly Val Ala Thr Ala Leu Ala Cys Ala Met Leu Asp | |
| 115 120 125 | |

| | |
|---|-----|
| atg ccg tgc cgt gtt tat atg ggc gcg aaa gat gtg gaa cgc caa tcg | 432 |
| Met Pro Cys Arg Val Tyr Met Gly Ala Lys Asp Val Glu Arg Gln Ser | |
| 130 135 140 | |

| | |
|---|-----|
| ccg aat gtg ttt cgt atg cgt tta atg ggc acg gaa gtg gta ccg gtg | 480 |
| Pro Asn Val Phe Arg Met Arg Leu Met Gly Thr Glu Val Val Pro Val | |
| 145 150 155 160 | |

| | |
|---|-----|
| caa aaa ggt tcc tgt tct ttg aaa gac gct tgc tgc gaa gcc atg cgt | 528 |
| Gln Lys Gly Ser Cys Ser Leu Lys Asp Ala Cys Cys Glu Ala Met Arg | |
| 165 170 175 | |

| | |
|---|-----|
| gac tgg tcg gca aat tat gaa aat acg cac tat ttg ctc ggc aca gcg | 576 |
| Asp Trp Ser Ala Asn Tyr Glu Asn Thr His Tyr Leu Leu Gly Thr Ala | |
| 180 185 190 | |

| | |
|-------------|-----|
| gca ggt ccg | 585 |
| Ala Gly Pro | |

195

<210> 36
<211> 195
<212> PRT
<213> Actinobacillus actinomycetemcomitans

<400> 36

Met Ala Glu Thr Ile Leu Asn Pro Tyr Phe Gly Glu Phe Gly Gly Met
1 5 10 15

Tyr Val Pro Glu Ile Leu Val Pro Val Leu Gln Gln Leu Glu Lys Ala
20 25 30

Phe Val Glu Ala Lys Ala Asp Pro Ala Phe Gln Arg Glu Phe Gln Asp
35 40 45

Leu Leu Lys Asn Tyr Ala Gly Arg Pro Thr Ala Leu Thr Leu Cys Arg
50 55 60

Asn Leu Thr Lys Gly Thr Asn Ala Lys Ile Tyr Leu Lys Arg Glu Asp
65 70 75 80

Leu Leu His Gly Gly Ala His Lys Thr Asn Gln Val Leu Gly Gln Ile
85 90 95

Leu Leu Ala Lys Arg Met Gly Lys Thr Arg Ile Ile Ala Glu Thr Gly
100 105 110

Ala Gly Gln His Gly Val Ala Thr Ala Leu Ala Cys Ala Met Leu Asp
115 120 125

Met Pro Cys Arg Val Tyr Met Gly Ala Lys Asp Val Glu Arg Gln Ser
130 135 140

Pro Asn Val Phe Arg Met Arg Leu Met Gly Thr Glu Val Val Pro Val
145 150 155 160

Gln Lys Gly Ser Cys Ser Leu Lys Asp Ala Cys Cys Glu Ala Met Arg
165 170 175

Asp Trp Ser Ala Asn Tyr Glu Asn Thr His Tyr Leu Leu Gly Thr Ala
180 185 190

Ala Gly Pro
195

<210> 37
<211> 543
<212> DNA
<213> Actinobacillus actinomycetemcomitans

<220>
<221> CDS
<222> (1)..(543)

<400> 37
atg tcg cac gta ttt caa atc tca aga gaa att atg aca gct tta aat 48
Met Ser His Val Phe Gln Ile Ser Arg Glu Ile Met Thr Ala Leu Asn
1 5 10 15
gta ctt att tac ccg gaa gag cac ctt aaa gtg gtt tgc gat ccg gtc 96
Val Leu Ile Tyr Pro Glu Glu His Leu Lys Val Val Cys Asp Pro Val
20 25 30
gtg gaa gtc aat gac aac acg cgt aag att att gat aat atg ttt gat 144
Val Glu Val Asn Asp Asn Thr Arg Lys Ile Ile Asp Asn Met Phe Asp
35 40 45
acc atg tat cag gaa ggc ggt atc ggc cta gcg gca ccg cag gtg gat 192
Thr Met Tyr Gln Glu Gly Gly Ile Gly Leu Ala Ala Pro Gln Val Asp
50 55 60
att tta cag cgt att atc act att gat att gag ggt gac aaa caa aac 240
Ile Leu Gln Arg Ile Ile Thr Ile Asp Ile Glu Gly Asp Lys Gln Asn
65 70 75 80
cag tta gtg ttg att aac cct gaa att ttg gaa tcg gaa ggt gaa acc 288
Gln Leu Val Leu Ile Asn Pro Glu Ile Leu Glu Ser Glu Gly Glu Thr
85 90 95
gga att gaa gag ggt tgt ttg tcg att ccc gga ttt cgt gcg tta gtg 336
Gly Ile Glu Glu Gly Cys Leu Ser Ile Pro Gly Phe Arg Ala Leu Val
100 105 110
cca cgt aaa gag aaa gtg act gta aaa gcg ctg gat cgt cat ggt aaa 384
Pro Arg Lys Glu Lys Val Thr Val Lys Ala Leu Asp Arg His Gly Lys
115 120 125
gaa ttc acc tta aaa gcc gat ggt ctg ttg gca att tgt att cag cat 432
Glu Phe Thr Leu Lys Ala Asp Gly Leu Leu Ala Ile Cys Ile Gln His
130 135 140
gaa att gat cat tta aac ggt att ctt ttt gtg gat tat ctc tct cca 480
Glu Ile Asp His Leu Asn Gly Ile Leu Phe Val Asp Tyr Leu Ser Pro
145 150 155 160
ttg aaa cgt cag cgg att aaa gaa aag ctg att aaa atg aaa aag cag 528
Leu Lys Arg Gln Arg Ile Lys Glu Lys Leu Ile Lys Met Lys Lys Gln

165

170

175

543

atg gaa aag caa aaa
Met Glu Lys Gln Lys
180

<210> 38
<211> 181
<212> PRT
<213> Actinobacillus actinomycetemcomitans

<400> 38

Met Ser His Val Phe Gln Ile Ser Arg Glu Ile Met Thr Ala Leu Asn
1 5 10 15

Val Leu Ile Tyr Pro Glu Glu His Leu Lys Val Val Cys Asp Pro Val
20 25 30

Val Glu Val Asn Asp Asn Thr Arg Lys Ile Ile Asp Asn Met Phe Asp
35 40 45

Thr Met Tyr Gln Glu Gly Gly Ile Gly Leu Ala Ala Pro Gln Val Asp
50 55 60

Ile Leu Gln Arg Ile Ile Thr Ile Asp Ile Glu Gly Asp Lys Gln Asn
65 70 75 80

Gln Leu Val Leu Ile Asn Pro Glu Ile Leu Glu Ser Glu Gly Glu Thr
85 90 95

Gly Ile Glu Glu Gly Cys Leu Ser Ile Pro Gly Phe Arg Ala Leu Val
100 105 110

Pro Arg Lys Glu Lys Val Thr Val Lys Ala Leu Asp Arg His Gly Lys
115 120 125

Glu Phe Thr Leu Lys Ala Asp Gly Leu Leu Ala Ile Cys Ile Gln His
130 135 140

Glu Ile Asp His Leu Asn Gly Ile Leu Phe Val Asp Tyr Leu Ser Pro
145 150 155 160

Leu Lys Arg Gln Arg Ile Lys Glu Lys Leu Ile Lys Met Lys Lys Gln
165 170 175

Met Glu Lys Gln Lys
180

<210> 39
<211> 353
<212> DNA
<213> Actinobacillus actinomycetemcomitans

<220>
<221> CDS
<222> (1) .. (351)

<400> 39
cgc ggc gtg aca ccg gaa cta ttc gcc gac tgg tta aaa cag tta cat 48
Arg Gly Val Thr Pro Glu Leu Phe Ala Asp Trp Leu Lys Gln Leu His
1 5 10 15

cag gcg ggc gta aaa gtg gtg ttg gac agc agt aac gcc gca ttg acc 96
Gln Ala Gly Val Lys Val Val Leu Asp Ser Ser Asn Ala Ala Leu Thr
20 25 30

gcc ggc tta acg gcg caa cct tgg ttg gtt aaa ccg aat cat cgt gag 144
Ala Gly Leu Thr Ala Gln Pro Trp Leu Val Lys Pro Asn His Arg Glu
35 40 45

ttg gaa gcc tgg att ggt cat gcg ctg ccg acc ttg gac gac att atc 192
Leu Glu Ala Trp Ile Gly His Ala Leu Pro Thr Leu Asp Asp Ile Ile
50 55 60

gcg gcg gcg aaa aaa ctg aaa gca caa ggc att gct aac gtg att att 240
Ala Ala Ala Lys Lys Leu Lys Ala Gln Gly Ile Ala Asn Val Ile Ile
65 70 75 80

tcc atg ggc gcc aac ggt tcg ttg tgg ttg agc gat aca gcc gtc gta 288
Ser Met Gly Ala Asn Gly Ser Leu Trp Leu Ser Asp Thr Ala Val Val
85 90 95

cag gcg caa ccg ccg aaa tgc gaa aac gtg gtc agc acc gtg ggc gcg 336
Gln Ala Gln Pro Pro Lys Cys Glu Asn Val Val Ser Thr Val Gly Ala
100 105 110

ggc gat tct atg gtg gc 353
Gly Asp Ser Met Val
115

<210> 40
<211> 117
<212> PRT
<213> Actinobacillus actinomycetemcomitans

<400> 40
Arg Gly Val Thr Pro Glu Leu Phe Ala Asp Trp Leu Lys Gln Leu His
1 5 10 15

Phe Lys Met Ala Ser Lys Gly Gly Lys Leu Phe Pro Val Gln Gln Gln
65 70 75 80

gcg ttg ccg acc atc ggc aaa att gcc gga aag ggc agt acg ttt tcc 288
Ala Leu Pro Thr Ile Gly Lys Ile Ala Gly Lys Gly Ser Thr Phe Ser
85 90 95

gcc gaa aaa atc gtg gcg ctt caa ccg aat ttg att att gat gtg ggc 336
Ala Glu Lys Ile Val Ala Leu Gln Pro Asn Leu Ile Ile Asp Val Gly
100 105 110

aat gtg gcg ccg aat tac atc gat cag gca a 367
Asn Val Ala Pro Asn Tyr Ile Asp Gln Ala
115 120

<210> 42
<211> 122
<212> PRT
<213> Actinobacillus actinomycetemcomitans

<400> 42

Met Lys Lys Trp Phe Met Leu Leu Leu Pro Leu Thr Phe Ile Gly Ser
1 5 10 15

Leu Trp Ala Gln Glu Ala Pro Ser Pro Phe Leu Ala Gly Glu Leu Pro
20 25 30

Ala Ala Gln Lys Ile Glu Lys Val Leu Ser Ala Gly Asn Pro Ser Asp
35 40 45

Ala Leu Leu Leu Ala Ala Ala Pro Gln Lys Met Val Gly Leu Ala Gly
50 55 60

Phe Lys Met Ala Ser Lys Gly Gly Lys Leu Phe Pro Val Gln Gln Gln
65 70 75 80

Ala Leu Pro Thr Ile Gly Lys Ile Ala Gly Lys Gly Ser Thr Phe Ser
85 90 95

Ala Glu Lys Ile Val Ala Leu Gln Pro Asn Leu Ile Ile Asp Val Gly
100 105 110

Asn Val Ala Pro Asn Tyr Ile Asp Gln Ala
115 120

<210> 43
<211> 4593

<212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1)..(4593)

<400> 43

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| gtc ttt aaa gta atc tgg tgt aaa aca tct cag aca tgg att gcc gta | 48 |
| Val Phe Lys Val Ile Trp Cys Lys Thr Ser Gln Thr Trp Ile Ala Val | |
| 1 5 10 15 | |
| tct gaa cta tct aaa gct ttt tcc ctt tct acc act aca gat ata cct | 96 |
| Ser Glu Leu Ser Lys Ala Phe Ser Leu Ser Thr Thr Thr Asp Ile Pro | |
| 20 25 30 | |
| aaa aaa act aaa ata ttc att gct gca gcc ccg tta tta ttt ctc tcc | 144 |
| Lys Lys Thr Lys Ile Phe Ile Ala Ala Ala Pro Leu Leu Phe Leu Ser | |
| 35 40 45 | |
| ttt aat acc aac gct tac att gct ata ggt tct gtt gaa aac aat tct | 192 |
| Phe Asn Thr Asn Ala Tyr Ile Ala Ile Gly Ser Val Glu Asn Asn Ser | |
| 50 55 60 | |
| gtg aaa tcc gag ggg gca gaa gcc tcc cca aac aag aga aag gga agc | 240 |
| Val Lys Ser Glu Gly Ala Glu Ala Ser Pro Asn Lys Arg Lys Gly Ser | |
| 65 70 75 80 | |
| caa gca tta aat tat tac aac ccc ggt agt aaa tca tat gat gat aaa | 288 |
| Gln Ala Leu Asn Tyr Tyr Asn Pro Gly Ser Lys Ser Tyr Asp Asp Lys | |
| 85 90 95 | |
| gac aaa ccg agc aat cct gaa aga aga tac agc aat ggg gag gca tat | 336 |
| Asp Lys Pro Ser Asn Pro Glu Arg Arg Tyr Ser Asn Gly Glu Ala Tyr | |
| 100 105 110 | |
| ggt atc gct atc ggt aaa aat acc gat gtt cgt gac tca agt aag gat | 384 |
| Gly Ile Ala Ile Gly Lys Asn Thr Asp Val Arg Asp Ser Ser Lys Asp | |
| 115 120 125 | |
| tca aat ggt atc gcc tta ggc gat tat tct aaa gct acc ggt ggg ctt | 432 |
| Ser Asn Gly Ile Ala Leu Gly Asp Tyr Ser Lys Ala Thr Gly Gly Leu | |
| 130 135 140 | |
| gcc atg gcc tta ggt tca ttt tcc aga gca gaa aaa aat ggc ggt att | 480 |
| Ala Met Ala Leu Gly Ser Phe Ser Arg Ala Glu Lys Asn Gly Gly Ile | |
| 145 150 155 160 | |
| gca atc ggt ata gct tcc aga tca tca gga att aat tct ctt gcg atg | 528 |
| Ala Ile Gly Ile Ala Ser Arg Ser Ser Gly Ile Asn Ser Leu Ala Met | |
| 165 170 175 | |
| atg cgt caa tct gca gca acc ggg gat tat tct act gcc att ggt tct | 576 |
| Met Arg Gln Ser Ala Ala Thr Gly Asp Tyr Ser Thr Ala Ile Gly Ser | |
| 180 185 190 | |
| gtc gca tgg gct gca ggt caa tca agc ttc gca ctg ggg gct tct gct | 624 |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| Val | Ala | Trp | Ala | Ala | Gly | Gln | Ser | Ser | Phe | Ala | Leu | Gly | Ala | Ser | Ala | |
| | | 195 | | | | | 200 | | | | | 205 | | | | |
| act | gct | aaa | ggc | aac | caa | tcc | att | gca | att | ggc | agc | ttg | gaa | caa | aaa | 672 |
| Thr | Ala | Lys | Gly | Asn | Gln | Ser | Ile | Ala | Ile | Gly | Ser | Leu | Glu | Gln | Lys | |
| | | 210 | | | | 215 | | | | | 220 | | | | | |
| ata | tct | ccg | aat | ggg | tct | ggg | gtg | cca | atc | aca | aaa | tac | aac | ggg | tta | 720 |
| Ile | Ser | Pro | Asn | Gly | Ser | Gly | Val | Pro | Ile | Thr | Lys | Tyr | Asn | Gly | Leu | |
| 225 | | | | | 230 | | | | | 235 | | | | | 240 | |
| gac | aac | aca | caa | acc | aat | ggg | aac | cgt | tcc | atg | gca | ttg | ggg | acg | gca | 768 |
| Asp | Asn | Thr | Gln | Thr | Asn | Gly | Asn | Arg | Ser | Met | Ala | Leu | Gly | Thr | Ala | |
| | | | | 245 | | | | | 250 | | | | | 255 | | |
| gct | aaa | acc | aat | ggg | gat | gat | tca | ttt | gct | att | ggg | tat | aaa | gca | cac | 816 |
| Ala | Lys | Thr | Asn | Gly | Asp | Asp | Ser | Phe | Ala | Ile | Gly | Tyr | Lys | Ala | His | |
| | | | 260 | | | | 265 | | | | | | 270 | | | |
| acc | ggg | gag | ttt | aaa | gtg | gaa | cat | gac | aac | tat | cta | aaa | gag | aat | gtt | 864 |
| Thr | Gly | Glu | Phe | Lys | Val | Glu | His | Asp | Asn | Tyr | Leu | Lys | Glu | Asn | Val | |
| | | 275 | | | | | 280 | | | | | 285 | | | | |
| acc | tct | ccg | gat | ctg | tct | aaa | aaa | gct | gat | aaa | gcc | att | gct | gtc | ggg | 912 |
| Thr | Ser | Pro | Asp | Leu | Ser | Lys | Lys | Ala | Asp | Lys | Ala | Ile | Ala | Val | Gly | |
| | | 290 | | | | 295 | | | | | 300 | | | | | |
| acg | agt | gcc | ctt | gcg | caa | aaa | gaa | tct | gct | atc | gca | ttt | ggc | tac | caa | 960 |
| Thr | Ser | Ala | Leu | Ala | Gln | Lys | Glu | Ser | Ala | Ile | Ala | Phe | Gly | Tyr | Gln | |
| 305 | | | | | 310 | | | | | 315 | | | | | 320 | |
| gct | aat | gct | tcc | ggc | att | aat | gca | att | tct | ctt | ggc | gca | aat | gca | aaa | 1008 |
| Ala | Asn | Ala | Ser | Gly | Ile | Asn | Ala | Ile | Ser | Leu | Gly | Ala | Asn | Ala | Lys | |
| | | | | 325 | | | | | 330 | | | | | 335 | | |
| gca | tct | caa | gat | aac | gtt | gta | gca | ata | ggg | aaa | tat | gct | aca | gcc | act | 1056 |
| Ala | Ser | Gln | Asp | Asn | Val | Val | Ala | Ile | Gly | Lys | Tyr | Ala | Thr | Ala | Thr | |
| | | | 340 | | | | 345 | | | | | 350 | | | | |
| gaa | tct | ggg | tca | atg | gcc | att | ggg | cag | gga | gct | aaa | tct | acc | ttt | aaa | 1104 |
| Glu | Ser | Gly | Ser | Met | Ala | Ile | Gly | Gln | Gly | Ala | Lys | Ser | Thr | Phe | Lys | |
| | | 355 | | | | | 360 | | | | | 365 | | | | |
| aac | tca | ttg | gca | tta | ggg | aca | ggg | acc | att | gtc | aac | agt | gtc | gat | ggc | 1152 |
| Asn | Ser | Leu | Ala | Leu | Gly | Thr | Gly | Thr | Ile | Val | Asn | Ser | Val | Asp | Gly | |
| | | 370 | | | | 375 | | | | | 380 | | | | | |
| ggg | caa | tct | aaa | ttt | act | gca | caa | aat | tat | gat | gct | aat | aat | ggg | gtt | 1200 |
| Gly | Gln | Ser | Lys | Phe | Thr | Ala | Gln | Asn | Tyr | Asp | Ala | Asn | Asn | Gly | Val | |
| 385 | | | | | 390 | | | | | 395 | | | | | 400 | |
| gta | gct | gtt | gca | aac | gcc | ggg | aaa | gag | cgt | cga | att | att | aat | gtt | gcc | 1248 |
| Val | Ala | Val | Ala | Asn | Ala | Gly | Lys | Glu | Arg | | | | | | | |

| | |
|---|------|
| aaa ccg agt aac caa gtg aag cta ctg gca gga aag aat tta gca gtc | 2016 |
| Lys Pro Ser Asn Gln Val Lys Leu Leu Ala Gly Lys Asn Leu Ala Val | |
| 660 665 670 | |
| aaa caa aac ggc act aac ttc acc ttc tca acc caa gaa aat gtc acg | 2064 |
| Lys Gln Asn Gly Thr Asn Phe Thr Phe Ser Thr Gln Glu Asn Val Thr | |
| 675 680 685 | |
| ttc act aat gtt acg acc caa gat cta act gca aca ggc aac acc act | 2112 |
| Phe Thr Asn Val Thr Thr Gln Asp Leu Thr Ala Thr Gly Asn Thr Thr | |
| 690 695 700 | |
| gtt aag aac ttc agc gtt caa aat ggc gga acc atc aat atg gga aat | 2160 |
| Val Lys Asn Phe Ser Val Gln Asn Gly Gly Thr Ile Asn Met Gly Asn | |
| 705 710 715 720 | |
| aat cgc att acc ggt gtc gct gaa ggc act caa gat gac gac gcg gtt | 2208 |
| Asn Arg Ile Thr Gly Val Ala Glu Gly Thr Gln Asp Asp Ala Val | |
| 725 730 735 | |
| aac ttt aaa caa tta aaa agc ctt ctt ggt ggc tcc gca tca acg gaa | 2256 |
| Asn Phe Lys Gln Leu Lys Ser Leu Leu Gly Gly Ser Ala Ser Thr Glu | |
| 740 745 750 | |
| att gtt gag aaa aaa gca gct caa gcc gga gat gaa aac ctg gcg gat | 2304 |
| Ile Val Glu Lys Lys Ala Ala Gln Ala Gly Asp Glu Asn Leu Ala Asp | |
| 755 760 765 | |
| att agc gta gca aat ggt aaa aac gcc ggc gat atg ggt gcg aaa tac | 2352 |
| Ile Ser Val Ala Asn Gly Lys Asn Ala Gly Asp Met Gly Ala Lys Tyr | |
| 770 775 780 | |
| gaa gta tct gta tcc aaa aaa gcc gta caa agt gcc gca aaa gaa gcg | 2400 |
| Glu Val Ser Val Ser Lys Lys Ala Val Gln Ser Ala Ala Lys Glu Ala | |
| 785 790 795 800 | |
| gtt aaa gtg aca ggt tcg gca ccg att aat gta aac aaa aca gat gta | 2448 |
| Val Lys Val Thr Gly Ser Ala Pro Ile Asn Val Asn Lys Thr Asp Val | |
| 805 810 815 | |
| aat ggc gtt gat act tat gcc gta acc ttt aat ggc aca gaa gcg gcg | 2496 |
| Asn Gly Val Asp Thr Tyr Ala Val Thr Phe Asn Gly Thr Glu Ala Ala | |
| 820 825 830 | |
| aaa tct atc cca tta act tat aaa gct aac ggt agc ggt gat aaa acc | 2544 |
| Lys Ser Ile Pro Leu Thr Tyr Lys Ala Asn Gly Ser Gly Asp Lys Thr | |
| 835 840 845 | |
| gtc atg ttg gat aaa gga tta aac ttt acc aat ggt atg atg aca acc | 2592 |
| Val Met Leu Asp Lys Gly Leu Asn Phe Thr Asn Gly Met Met Thr Thr | |
| 850 855 860 | |
| gct tcc gtg gca aat gac ggt gtg gtg aaa tat gac gtc aat tta tcc | 2640 |
| Ala Ser Val Ala Asn Asp Gly Val Val Lys Tyr Asp Val Asn Leu Ser | |
| 865 870 875 880 | |

| | | | | | | | | | | | | | | | |
|------|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|------|-----|-----|-----|------|
| Ser | Trp | Thr | Gly | Ala | Pro | Thr | Thr | Gly | Arg | Ala | Ala | Thr | Glu | Asp | |
| 1100 | | | | | | 1105 | | | | | 1110 | | | | |
| caa | tta | tct | ata | gtc | gat | aaa | aaa | ttc | gat | aat | aag | gtt | tct | tta | 3384 |
| Gln | Leu | Ser | Ile | Val | Asp | Lys | Lys | Phe | Asp | Asn | Lys | Val | Ser | Leu | |
| 1115 | | | | | | 1120 | | | | | 1125 | | | | |
| ggc | ggt | gac | aac | ggg | agt | acc | aca | gag | aaa | tcc | ttg | tct | cac | aac | 3429 |
| Gly | Gly | Asp | Asn | Gly | Ser | Thr | Thr | Glu | Lys | Ser | Leu | Ser | His | Asn | |
| 1130 | | | | | | 1135 | | | | | 1140 | | | | |
| ggc | gga | atc | aaa | ttt | aat | atc | aaa | ggc | gga | gac | agc | caa | aaa | tat | 3474 |
| Gly | Gly | Ile | Lys | Phe | Asn | Ile | Lys | Gly | Gly | Asp | Ser | Gln | Lys | Tyr | |
| 1145 | | | | | | 1150 | | | | | 1155 | | | | |
| gtg | acg | aca | tca | gga | tcc | ggc | gat | gat | gtc | acg | gtg | gat | ctt | gcc | 3519 |
| Val | Thr | Thr | Ser | Gly | Ser | Gly | Asp | Asp | Val | Thr | Val | Asp | Leu | Ala | |
| 1160 | | | | | | 1165 | | | | | 1170 | | | | |
| caa | acc | aca | aaa | aat | aag | atc | gac | aat | gcg | gca | gat | aaa | gat | ctc | 3564 |
| Gln | Thr | Thr | Lys | Asn | Lys | Ile | Asp | Asn | Ala | Ala | Asp | Lys | Asp | Leu | |
| 1175 | | | | | | 1180 | | | | | 1185 | | | | |
| gcc | aac | att | acc | gat | aat | ggg | aaa | aaa | gtt | att | acc | gct | tta | ggc | 3609 |
| Ala | Asn | Ile | Thr | Asp | Asn | Gly | Lys | Lys | Val | Ile | Thr | Ala | Leu | Gly | |
| 1190 | | | | | | 1195 | | | | | 1200 | | | | |
| gct | gta | gtg | aaa | gcg | gct | gat | tct | acg | att | acg | gta | act | gac | gaa | 3654 |
| Ala | Val | Val | Lys | Ala | Ala | Asp | Ser | Thr | Ile | Thr | Val | Thr | Asp | Glu | |
| 1205 | | | | | | 1210 | | | | | 1215 | | | | |
| acc | gat | aat | acg | aca | gga | caa | aaa | acc | tac | aaa | atc | aaa | gcc | aat | 3699 |
| Thr | Asp | Asn | Thr | Thr | Gly | Gln | Lys | Thr | Tyr | Lys | Ile | Lys | Ala | Asn | |
| 1220 | | | | | | 1225 | | | | | 1230 | | | | |
| att | cca | aca | ccg | gaa | aaa | aca | gca | atg | gct | ccc | ggc | aac | aat | aca | 3744 |
| Ile | Pro | Thr | Pro | Glu | Lys | Thr | Ala | Met | Ala | Pro | Gly | Asn | Asn | Thr | |
| 1235 | | | | | | 1240 | | | | | 1245 | | | | |
| acc | att | gaa | ggg | gat | ggc | tca | gcc | gcc | aat | ccg | ttt | aaa | gtg | aat | 3789 |
| Thr | Ile | Glu | Gly | Asp | Gly | Ser | Ala | Ala | Asn | Pro | Phe | Lys | Val | Asn | |
| 1250 | | | | | | 1255 | | | | | 1260 | | | | |
| ctg | aaa | gat | gat | tta | gcg | cta | ggg | caa | aaa | gac | gct | aac | ggc | gta | 3834 |
| Leu | Lys | Asp | Asp | Leu | Ala | Leu | Gly | Gln | Lys | Asp | Ala | Asn | Gly | Val | |
| 1265 | | | | | | 1270 | | | | | 1275 | | | | |
| acc | ggg | aaa | gat | tct | tcc | att | aaa | gtg | aac | ggc | aaa | gat | ggc | tcc | 3879 |
| Thr | Gly | Lys | Asp | Ser | Ser | Ile | Lys | Val | Asn | Gly | Lys | Asp | Gly | Ser | |
| 1280 | | | | | | 1285 | | | | | 1290 | | | | |
| ggg | gtg | gcg | att | aac | ggg | aaa | gac | ggg | tcc | att | gca | tta | aat | ggc | 3924 |
| Gly | Val | Ala | Ile | Asn | Gly | Lys | Asp | Gly | Ser | Ile | Ala | Leu | Asn | Gly | |
| 1295 | | | | | | 1300 | | | | | 1305 | | | | |
| aaa | gac | ggg | gcg | aat | cct | gtc | acc | atc | aaa | acg | | | | | |

| | | |
|-----------------------------|---------------------------------|------|
| gcc ggt gtg aat gaa acc aat | ccc aaa gac cgt tta atg gtg aat | 4014 |
| Ala Gly Val Asn Glu Thr Asn | Pro Lys Asp Arg Leu Met Val Asn | |
| 1325 | 1330 1335 | |
| aac gac gct gtt gca acc ctt | aaa gac ggc tta aaa ttc gcc gga | 4059 |
| Asn Asp Ala Val Ala Thr Leu | Lys Asp Gly Leu Lys Phe Ala Gly | |
| 1340 | 1345 1350 | |
| gat aac agc acc gaa gtc atc | act aaa acc tta aat caa aaa ctg | 4104 |
| Asp Asn Ser Thr Glu Val Ile | Thr Lys Thr Leu Asn Gln Lys Leu | |
| 1355 | 1360 1365 | |
| gaa att gtg ggt ggt gca gat | aaa aac aaa tta tct gac aac aat | 4149 |
| Glu Ile Val Gly Gly Ala Asp | Lys Asn Lys Leu Ser Asp Asn Asn | |
| 1370 | 1375 1380 | |
| atc ggc gta aat gcc aat aac | ggc aaa ctg gaa gtg aaa tta gcc | 4194 |
| Ile Gly Val Asn Ala Asn Asn | Gly Lys Leu Glu Val Lys Leu Ala | |
| 1385 | 1390 1395 | |
| aaa gag ttg aat gag tta acc | agt gcg caa ttc aag aat ggc gac | 4239 |
| Lys Glu Leu Asn Glu Leu Thr | Ser Ala Gln Phe Lys Asn Gly Asp | |
| 1400 | 1405 1410 | |
| aac aca acg gtt atc aat ggc | aat ggc ata aca att acc ccg aaa | 4284 |
| Asn Thr Thr Val Ile Asn Gly | Asn Gly Ile Thr Ile Thr Pro Lys | |
| 1415 | 1420 1425 | |
| gat ccg aca aag gcg gtc agc | tta acg gat aaa gga cta aac aat | 4329 |
| Asp Pro Thr Lys Ala Val Ser | Leu Thr Asp Lys Gly Leu Asn Asn | |
| 1430 | 1435 1440 | |
| ggg ggt aat caa att gtg aac | att gac agc gga tta aaa caa gcc | 4374 |
| Gly Gly Asn Gln Ile Val Asn | Ile Asp Ser Gly Leu Lys Gln Ala | |
| 1445 | 1450 1455 | |
| gac ggt tca aca gtt gct tta | aaa gac gcc tca ggt gat acc tta | 4419 |
| Asp Gly Ser Thr Val Ala Leu | Lys Asp Ala Ser Gly Asp Thr Leu | |
| 1460 | 1465 1470 | |
| aaa aat gcg gcg aat atc ggc | gat tta caa aaa tcc att aac gac | 4464 |
| Lys Asn Ala Ala Asn Ile Gly | Asp Leu Gln Lys Ser Ile Asn Asp | |
| 1475 | 1480 1485 | |
| att acc gac gca agt aaa aac | ggc ggc ttc ggt tta agc gat gac | 4509 |
| Ile Thr Asp Ala Ser Lys Asn | Gly Gly Phe Gly Leu Ser Asp Asp | |
| 1490 | 1495 1500 | |
| aat ggc gca acc gct aaa gcc | aac tta ggt gaa acc cgt gaa agt | 4554 |
| Asn Gly Ala Thr Ala Lys Ala | Asn Leu Gly Glu Thr Arg Glu Ser | |
| 1505 | 1510 1515 | |
| gaa agg cga tgg cag tgt tat | tac aaa agt agt tac cga | 4593 |
| Glu Arg Arg Trp Gln Cys Tyr | Tyr Lys Ser Ser Tyr Arg | |
| 1520 | 1525 1530 | |

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 <213> Actinobacillus actinomycetemcomitans

<400> 44

Val Phe Lys Val Ile Trp Cys Lys Thr Ser Gln Thr Trp Ile Ala Val
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Ser Glu Leu Ser Lys Ala Phe Ser Leu Ser Thr Thr Thr Asp Ile Pro
 20 25 30

Lys Lys Thr Lys Ile Phe Ile Ala Ala Ala Pro Leu Leu Phe Leu Ser
 35 40 45

Phe Asn Thr Asn Ala Tyr Ile Ala Ile Gly Ser Val Glu Asn Asn Ser
 50 55 60

Val Lys Ser Glu Gly Ala Glu Ala Ser Pro Asn Lys Arg Lys Gly Ser
 65 70 75 80

Gln Ala Leu Asn Tyr Tyr Asn Pro Gly Ser Lys Ser Tyr Asp Asp Lys
 85 90 95

Asp Lys Pro Ser Asn Pro Glu Arg Arg Tyr Ser Asn Gly Glu Ala Tyr
 100 105 110

Gly Ile Ala Ile Gly Lys Asn Thr Asp Val Arg Asp Ser Ser Lys Asp
 115 120 125

Ser Asn Gly Ile Ala Leu Gly Asp Tyr Ser Lys Ala Thr Gly Gly Leu
 130 135 140

Ala Met Ala Leu Gly Ser Phe Ser Arg Ala Glu Lys Asn Gly Gly Ile
 145 150 155 160

Ala Ile Gly Ile Ala Ser Arg Ser Ser Gly Ile Asn Ser Leu Ala Met
 165 170 175

Met Arg Gln Ser Ala Ala Thr Gly Asp Tyr Ser Thr Ala Ile Gly Ser
 180 185 190

Val Ala Trp Ala Ala Gly Gln Ser Ser Phe Ala Leu Gly Ala Ser Ala
195 200 205

Thr Ala Lys Gly Asn Gln Ser Ile Ala Ile Gly Ser Leu Glu Gln Lys
210 215 220

Ile Ser Pro Asn Gly Ser Gly Val Pro Ile Thr Lys Tyr Asn Gly Leu
225 230 235 240

Asp Asn Thr Gln Thr Asn Gly Asn Arg Ser Met Ala Leu Gly Thr Ala
245 250 255

Ala Lys Thr Asn Gly Asp Asp Ser Phe Ala Ile Gly Tyr Lys Ala His
260 265 270

Thr Gly Glu Phe Lys Val Glu His Asp Asn Tyr Leu Lys Glu Asn Val
275 280 285

Thr Ser Pro Asp Leu Ser Lys Lys Ala Asp Lys Ala Ile Ala Val Gly
290 295 300

Thr Ser Ala Leu Ala Gln Lys Glu Ser Ala Ile Ala Phe Gly Tyr Gln
305 310 315 320

Ala Asn Ala Ser Gly Ile Asn Ala Ile Ser Leu Gly Ala Asn Ala Lys
325 330 335

Ala Ser Gln Asp Asn Val Val Ala Ile Gly Lys Tyr Ala Thr Ala Thr
340 345 350

Glu Ser Gly Ser Met Ala Ile Gly Gln Gly Ala Lys Ser Thr Phe Lys
355 360 365

Asn Ser Leu Ala Leu Gly Thr Gly Thr Ile Val Asn Ser Val Asp Gly
370 375 380

Gly Gln Ser Lys Phe Thr Ala Gln Asn Tyr Asp Ala Asn Asn Gly Val
385 390 395 400

Val Ala Val Ala Asn Ala Gly Lys Glu Arg Arg Ile Ile Asn Val Ala
405 410 415

Gly Gly Arg Asn Asp Thr Asp Ala Val Asn Ile Ala Gln Leu Lys Phe

420

425

430

Val Asn Asp Asn Leu Ala Lys Ser Ile Ala Gly Ala Gly Tyr Asn Gly
435 440 445

Tyr Glu Thr Asp Gly His Thr Tyr Lys Ala Pro Val Phe Ser Ile Lys
450 455 460

Asn Thr Asn Tyr His Asp Val Lys Thr Ala Val Glu Ala Ala Gln Thr
465 470 475 480

Asn Tyr Val Ser Val Asn Ser Thr Asn Thr Ala Ala Asp Ser Asn Tyr
485 490 495

Asp Asn Lys Gly Ala Lys Ala Val Gly Ser Ile Ala Leu Gly Glu Lys
500 505 510

Ala Thr Thr Gly Thr Ala Ala Met Asn Ser Ile Ala Ile Gly Leu Asn
515 520 525

Ser Asn Val Ser Gly Gln Asn Thr Val Ala Leu Gly Ala Asn Ile Thr
530 535 540

Ala Thr Thr Asn Gly Ser Val Ile Leu Gly Asn Ser Ser Thr Thr Glu
545 550 555 560

Gly Ser His Pro Val Ser Asn Val Ser Ser Ala Thr Val Asn Gly Tyr
565 570 575

Thr Tyr Ser Gly Phe Thr Gly Thr Val Lys Glu Ser Gly His Phe Val
580 585 590

Ser Ile Gly Ser Lys Gly Asn Glu Arg Gln Ile Lys Asn Val Ala Ala
595 600 605

Gly Asn Val Ala Ala Asn Ser Thr Asp Ala Val Asn Gly Ser Gln Leu
610 615 620

Phe Ala Val Ala Ser Arg Val Glu Gln Gly Trp Gln Ile Thr Ser Gly
625 630 635 640

Val Glu Asn Gly Gly Thr Gln Asn Gly Ala Ala Ser Thr Ala Thr Ile
645 650 655

Lys Pro Ser Asn Gln Val Lys Leu Leu Ala Gly Lys Asn Leu Ala Val
660 665 670

Lys Gln Asn Gly Thr Asn Phe Thr Phe Ser Thr Gln Glu Asn Val Thr
675 680 685

Phe Thr Asn Val Thr Thr Gln Asp Leu Thr Ala Thr Gly Asn Thr Thr
690 695 700

Val Lys Asn Phe Ser Val Gln Asn Gly Gly Thr Ile Asn Met Gly Asn
705 710 715 720

Asn Arg Ile Thr Gly Val Ala Glu Gly Thr Gln Asp Asp Asp Ala Val
725 730 735

Asn Phe Lys Gln Leu Lys Ser Leu Leu Gly Gly Ser Ala Ser Thr Glu
740 745 750

Ile Val Glu Lys Lys Ala Ala Gln Ala Gly Asp Glu Asn Leu Ala Asp
755 760 765

Ile Ser Val Ala Asn Gly Lys Asn Ala Gly Asp Met Gly Ala Lys Tyr
770 775 780

Glu Val Ser Val Ser Lys Lys Ala Val Gln Ser Ala Ala Lys Glu Ala
785 790 795 800

Val Lys Val Thr Gly Ser Ala Pro Ile Asn Val Asn Lys Thr Asp Val
805 810 815

Asn Gly Val Asp Thr Tyr Ala Val Thr Phe Asn Gly Thr Glu Ala Ala
820 825 830

Lys Ser Ile Pro Leu Thr Tyr Lys Ala Asn Gly Ser Gly Asp Lys Thr
835 840 845

Val Met Leu Asp Lys Gly Leu Asn Phe Thr Asn Gly Met Met Thr Thr
850 855 860

Ala Ser Val Ala Asn Asp Gly Val Val Lys Tyr Asp Val Asn Leu Ser
865 870 875 880

Thr Ile Lys Val Glu Asp Gly Lys Ala Ala Val Ala Gly Thr Pro Gly
885 890 895

Thr Asn Gly Ala Asn Gly Thr Asp Gly Lys Asp Gly Val Ala Thr Val
900 905 910

Lys Asn Val Val Glu Ala Leu Asn Asn Ala Ala Trp Thr Ile Thr Ala
915 920 925

Ser Lys Ser Asp Gly Glu Val Val Ser Asn Ala Ser Asn Ser Val Lys
930 935 940

Asn Gly Asp Thr Val Thr Tyr Asp Ala Gly Lys Asn Ile Lys Ile Thr
945 950 955 960

Gln Arg Asp Lys Lys Phe Ser Phe Ala Thr Lys Asp Asn Val Glu Phe
965 970 975

Thr Ser Val Thr Thr Gly Asn Thr Lys Leu Thr Gly Asn Gly Val Glu
980 985 990

Ile Thr Asn Gly Pro Lys Leu Thr Gln Ser Gly Val Asp Ala Gly Gly
995 1000 1005

Lys Lys Ile Thr Asn Val Ala Asp Gly Val Ile Ala Ala Asn Ser
1010 1015 1020

Lys Asp Ala Val Asn Gly Gly Gln Leu Phe Ala Glu Thr Ala Lys
1025 1030 1035

Ala Lys Thr Thr Val Glu Lys Gly Asp Asp Asn Ile Gln Ile Thr
1040 1045 1050

Ser Glu Thr Ala Thr Asp Gly His Ile Asn Tyr Lys Val Ala Leu
1055 1060 1065

Asn Pro Ser Leu Thr Val Gly Pro Arg Thr Asn Gly His Pro Ile
1070 1075 1080

Thr Ile Asp Gly Asn Asn Gly Tyr Ile Thr Gly Leu Thr Asn Thr
1085 1090 1095

| |
|---|
| Ala Gly Val Asn Glu Thr Asn Pro Lys Asp Arg Leu Met Val Asn 1325 1330 1335 |
| Asn Asp Ala Val Ala Thr Leu Lys Asp Gly Leu Lys Phe Ala Gly 1340 1345 1350 |
| Asp Asn Ser Thr Glu Val Ile Thr Lys Thr Leu Asn Gln Lys Leu 1355 1360 1365 |
| Glu Ile Val Gly Gly Ala Asp Lys Asn Lys Leu Ser Asp Asn Asn 1370 1375 1380 |
| Ile Gly Val Asn Ala Asn Asn Gly Lys Leu Glu Val Lys Leu Ala 1385 1390 1395 |
| Lys Glu Leu Asn Glu Leu Thr Ser Ala Gln Phe Lys Asn Gly Asp 1400 1405 1410 |
| Asn Thr Thr Val Ile Asn Gly Asn Gly Ile Thr Ile Thr Pro Lys 1415 1420 1425 |
| Asp Pro Thr Lys Ala Val Ser Leu Thr Asp Lys Gly Leu Asn Asn 1430 1435 1440 |
| Gly Gly Asn Gln Ile Val Asn Ile Asp Ser Gly Leu Lys Gln Ala 1445 1450 1455 |
| Asp Gly Ser Thr Val Ala Leu Lys Asp Ala Ser Gly Asp Thr Leu 1460 1465 1470 |
| Lys Asn Ala Ala Asn Ile Gly Asp Leu Gln Lys Ser Ile Asn Asp 1475 1480 1485 |
| Ile Thr Asp Ala Ser Lys Asn Gly Gly Phe Gly Leu Ser Asp Asp 1490 1495 1500 |
| Asn Gly Ala Thr Ala Lys Ala Asn Leu Gly Glu Thr Arg Glu Ser 1505 1510 1515 |
| Glu Arg Arg Trp Gln Cys Tyr Tyr Lys Ser Ser Tyr Arg 1520 1525 1530 |

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 <213> Actinobacillus actinomycetemcomitans

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 <221> CDS
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 Gln Glu Ile Ile Asn Leu Ala Pro Lys Gly Leu Ile Thr Ala Ala Ser
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cct tat tta tac ggt gta acc cgt agt gat ttg gaa aaa atc gtc atc 96
 Pro Tyr Leu Tyr Gly Val Thr Arg Ser Asp Leu Glu Lys Ile Val Ile
 20 25 30

atg ggc gtg tgg ttt gaa gac atg aaa acc ctc gcg ccc tac tgg caa 144
 Met Gly Val Trp Phe Glu Asp Met Lys Thr Leu Ala Pro Tyr Trp Gln
 35 40 45

atc acc ggc acg ccc acc ggt gtc aac ttt gac gaa cgc aac gcc atg 192
 Ile Thr Gly Thr Pro Thr Gly Val Asn Phe Asp Glu Arg Asn Ala Met
 50 55 60

atc ggc aaa acc ctc gcc gaa cgc tta aac ctg aaa gtg ggc agt aag 240
 Ile Gly Lys Thr Leu Ala Glu Arg Leu Asn Leu Lys Val Gly Ser Lys
 65 70 75 80

ctg acc tta agc ctg aat tcg gta gat aaa cac cag ttt acg att aaa 288
 Leu Thr Leu Ser Leu Asn Ser Val Asp Lys His Gln Phe Thr Ile Lys
 85 90 95

gcc atc gtg gaa gcg ggc gac gcc acc gac aat atg ctc atc gtg agc 336
 Ala Ile Val Glu Ala Gly Asp Ala Thr Asp Asn Met Leu Ile Val Ser
 100 105 110

ctg gat ttc gcg caa aac tgg ctg gaa aaa gaa aac ttt gcc acc aat 384
 Leu Asp Phe Ala Gln Asn Trp Leu Glu Lys Glu Asn Phe Ala Thr Asn
 115 120 125

gcc ctg ctt aac gtg aaa aat gat cag ggg caa gtg gaa caa ttc gca 432
 Ala Leu Leu Asn Val Lys Asn Asp Gln Gly Gln Val Glu Gln Phe Ala
 130 135 140

cag caa ctt cag caa caa tat ccc gat ttg gat att cat ccg atc cgc 480
 Gln Gln Leu Gln Gln Tyr Pro Asp Leu Asp Ile His Pro Ile Arg
 145 150 155 160

aaa gtc tcc gcc tcc gaa ggg caa att ctg gat aag att aaa ggc ttg 528
 Lys Val Ser Ala Ser Glu Gly Gln Ile Leu Asp Lys Ile Lys Gly Leu
 165 170 175

atg ggc ttg att tcc gtg gtg att ctg att tta gcc a 565

Met Gly Leu Ile Ser Val Val Ile Leu Ile Leu Ala
180 185

<210> 46
<211> 188
<212> PRT
<213> Actinobacillus actinomycetemcomitans

<400> 46

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Pro Tyr Leu Tyr Gly Val Thr Arg Ser Asp Leu Glu Lys Ile Val Ile
20 25 30

Met Gly Val Trp Phe Glu Asp Met Lys Thr Leu Ala Pro Tyr Trp Gln
35 40 45

Ile Thr Gly Thr Pro Thr Gly Val Asn Phe Asp Glu Arg Asn Ala Met
50 55 60

Ile Gly Lys Thr Leu Ala Glu Arg Leu Asn Leu Lys Val Gly Ser Lys
65 70 75 80

Leu Thr Leu Ser Leu Asn Ser Val Asp Lys His Gln Phe Thr Ile Lys
85 90 95

Ala Ile Val Glu Ala Gly Asp Ala Thr Asp Asn Met Leu Ile Val Ser
100 105 110

Leu Asp Phe Ala Gln Asn Trp Leu Glu Lys Glu Asn Phe Ala Thr Asn
115 120 125

Ala Leu Leu Asn Val Lys Asn Asp Gln Gly Gln Val Glu Gln Phe Ala
130 135 140

Gln Gln Leu Gln Gln Gln Tyr Pro Asp Leu Asp Ile His Pro Ile Arg
145 150 155 160

Lys Val Ser Ala Ser Glu Gly Gln Ile Leu Asp Lys Ile Lys Gly Leu
165 170 175

Met Gly Leu Ile Ser Val Val Ile Leu Ile Leu Ala
180 185

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 caa aaa cgt cag gta aaa agt gcg gtt aaa aat cca agt gtt ttt aaa 96
 Gln Lys Arg Gln Val Lys Ser Ala Val Lys Asn Pro Ser Val Phe Lys
 20 25 30
 ggt cgt ttc ggt ttc agc aaa gat caa ctt atg gaa gcc ttc cgt atg 144
 Gly Arg Phe Gly Phe Ser Lys Asp Gln Leu Met Glu Ala Phe Arg Met
 35 40 45
 tcc gtc agt gcc att gta gcg cac aaa atg cgc tca ttg ctg acc atg 192
 Ser Val Ser Ala Ile Val Ala His Lys Met Arg Ser Leu Leu Thr Met
 50 55 60
 ctg gga att atc atc ggg atc act tcc gtc gtt tcc gtg gtg gcg tta 240
 Leu Gly Ile Ile Ile Gly Ile Thr Ser Val Val Ser Val Val Ala Leu
 65 70 75 80
 gga aat ggt tca caa caa aag att ttg gaa aat att cgc ggt atc ggc 288
 Gly Asn Gly Ser Gln Gln Lys Ile Leu Glu Asn Ile Arg Gly Ile Gly
 85 90 95
 aca aac aca atg acg att ttt aac ggt aat ggt ttc ggt gac cgt cgt 336
 Thr Asn Thr Met Thr Ile Phe Asn Gly Asn Gly Phe Gly Asp Arg Arg
 100 105 110
 tca cgg cac att caa aac cta aaa atc agc gat gcc aat acg tta tcg 384
 Ser Arg His Ile Gln Asn Leu Lys Ile Ser Asp Ala Asn Thr Leu Ser
 115 120 125
 aaa caa agt tat att caa agc gtt act cca aat acc tct tcc agc ggc 432
 Lys Gln Ser Tyr Ile Gln Ser Val Thr Pro Asn Thr Ser Ser Ser Gly
 130 135 140
 att tta gtg gtc ggt aac aaa tcc ttc aca tcc gcc aat tta tat ggt 480
 Ile Leu Val Val Gly Asn Lys Ser Phe Thr Ser Ala Asn Leu Tyr Gly
 145 150 155 160
 atc ggt gaa caa tat ttt gat gta gaa ggc ttg aag tta aaa cag ggc 528
 Ile Gly Glu Gln Tyr Phe Asp Val Glu Gly Leu Lys Leu Lys Gln Gly
 165 170 175
 cgt tta tta acc gag gac gat gtg gat caa agc aac cag gtg gtc gtg 576

Arg Leu Leu Thr Glu Asp Asp Val Asp Gln Ser Asn Gln Val Val Val
 180 185 190

ctg gac gaa agt gca aaa aaa gcc att ttt gcc aac gaa aat ccc ctt 624
 Leu Asp Glu Ser Ala Lys Lys Ala Ile Phe Ala Asn Glu Asn Pro Leu
 195 200 205

ggc aaa acg gtg att ttt aat aag cga cca ttt cgt gtc att gg 668
 Gly Lys Thr Val Ile Phe Asn Lys Arg Pro Phe Arg Val Ile
 210 215 220

<210> 48
 <211> 222
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 48

Ala Asn Arg Ile Ile Glu Ile Lys Asp Gly Glu Ile Ile Ser Asp Thr
 1 5 10 15

Gln Lys Arg Gln Val Lys Ser Ala Val Lys Asn Pro Ser Val Phe Lys
 20 25 30

Gly Arg Phe Gly Phe Ser Lys Asp Gln Leu Met Glu Ala Phe Arg Met
 35 40 45

Ser Val Ser Ala Ile Val Ala His Lys Met Arg Ser Leu Leu Thr Met
 50 55 60

Leu Gly Ile Ile Ile Gly Ile Thr Ser Val Val Ser Val Val Ala Leu
 65 70 75 80

Gly Asn Gly Ser Gln Gln Lys Ile Leu Glu Asn Ile Arg Gly Ile Gly
 85 90 95

Thr Asn Thr Met Thr Ile Phe Asn Gly Asn Gly Phe Gly Asp Arg Arg
 100 105 110

Ser Arg His Ile Gln Asn Leu Lys Ile Ser Asp Ala Asn Thr Leu Ser
 115 120 125

Lys Gln Ser Tyr Ile Gln Ser Val Thr Pro Asn Thr Ser Ser Ser Gly
 130 135 140

Ile Leu Val Val Gly Asn Lys Ser Phe Thr Ser Ala Asn Leu Tyr Gly
 145 150 155 160

Ile Gly Glu Gln Tyr Phe Asp Val Glu Gly Leu Lys Leu Lys Gln Gly
165 170 175

Arg Leu Leu Thr Glu Asp Asp Val Asp Gln Ser Asn Gln Val Val Val
180 185 190

Leu Asp Glu Ser Ala Lys Lys Ala Ile Phe Ala Asn Glu Asn Pro Leu
195 200 205

Gly Lys Thr Val Ile Phe Asn Lys Arg Pro Phe Arg Val Ile
210 215 220

<210> 49
<211> 276
<212> DNA
<213> Actinobacillus actinomycetemcomitans

<220>
<221> CDS
<222> (1)..(276)

<400> 49
atg aga atg cac aat cct cca cac ccg gga gaa ctg tta aaa gaa tat 48
Met Arg Met His Asn Pro Pro His Pro Gly Glu Leu Leu Lys Glu Tyr
1 5 10 15

att gat ggc gtg agt gtc acg aag gtt gcc caa aaa tta ggt gtt tcg 96
Ile Asp Gly Val Ser Val Thr Lys Val Ala Gln Lys Leu Gly Val Ser
20 25 30

cgt gtt acg ctt tcc cgc att ctt aat ggg aaa gca agt ata acg cct 144
Arg Val Thr Leu Ser Arg Ile Leu Asn Gly Lys Ala Ser Ile Thr Pro
35 40 45

gaa atg gct gtg cga tta agc gaa tta ttg aat acc aca aca ccg aaa 192
Glu Met Ala Val Arg Leu Ser Glu Leu Leu Asn Thr Thr Thr Pro Lys
50 55 60

tta tgg ctg ggt atg caa gca gac tac gat tta tgg caa att gaa caa 240
Leu Trp Leu Gly Met Gln Ala Asp Tyr Asp Leu Trp Gln Ile Glu Gln
65 70 75 80

caa cac gcc gta ttc aac atc caa cca tta ttt aat 276
Gln His Ala Val Phe Asn Ile Gln Pro Leu Phe Asn
85 90

<210> 50
<211> 92
<212> PRT
<213> Actinobacillus actinomycetemcomitans

<400> 50

Met Arg Met His Asn Pro Pro His Pro Gly Glu Leu Leu Lys Glu Tyr
1 5 10 15

Ile Asp Gly Val Ser Val Thr Lys Val Ala Gln Lys Leu Gly Val Ser
20 25 30

Arg Val Thr Leu Ser Arg Ile Leu Asn Gly Lys Ala Ser Ile Thr Pro
35 40 45

Glu Met Ala Val Arg Leu Ser Glu Leu Leu Asn Thr Thr Thr Pro Lys
50 55 60

Leu Trp Leu Gly Met Gln Ala Asp Tyr Asp Leu Trp Gln Ile Glu Gln
65 70 75 80

Gln His Ala Val Phe Asn Ile Gln Pro Leu Phe Asn
85 90

<210> 51

<211> 537

<212> DNA

<213> Actinobacillus actinomycetemcomitans

<220>

<221> CDS

<222> (1) .. (537)

<400> 51

caa cat aat ggt gta cta ggt cct tat atc ggt aaa ggc agt tta acc 48
Gln His Asn Gly Val Leu Gly Pro Tyr Ile Gly Lys Gly Ser Leu Thr
1 5 10 15

tta aaa tta ccg gct tac tgg gaa cta tca gga ttc cat caa tta acc 96
Leu Lys Leu Pro Ala Tyr Trp Glu Leu Ser Gly Phe His Gln Leu Thr
20 25 30

gat caa tgg gct atc cac tat agc tat aaa tat aca gaa tgg agt cgt 144
Asp Gln Trp Ala Ile His Tyr Ser Tyr Lys Tyr Thr Glu Trp Ser Arg
35 40 45

ttt aaa gaa tta cgc ggc aaa tat caa gat ggt tcc ggc tat gag gcc 192
Phe Lys Glu Leu Arg Gly Lys Tyr Gln Asp Gly Ser Gly Tyr Glu Ala
50 55 60

ttt acc aag aaa gag gaa tac aaa gac aac tcc cgt ttt gct att ggt 240
Phe Thr Lys Lys Glu Glu Tyr Lys Asp Asn Ser Arg Phe Ala Ile Gly
65 70 75 80

| | |
|---|-----|
| aca aca tat agc cta aat gat gct tta aca tta cgt gca ggt ttg gct | 288 |
| Thr Thr Tyr Ser Leu Asn Asp Ala Leu Thr Leu Arg Ala Gly Leu Ala | |
| 85 90 95 | |
| tac gat aaa gcc gcg agt aaa acg cat tta tct gcg tcc att cct gat | 336 |
| Tyr Asp Lys Ala Ala Ser Lys Thr His Leu Ser Ala Ser Ile Pro Asp | |
| 100 105 110 | |
| acc gac cgt atg tgg tat agt ata gga gcc acc tat aaa ttc acc ccg | 384 |
| Thr Asp Arg Met Trp Tyr Ser Ile Gly Ala Thr Tyr Lys Phe Thr Pro | |
| 115 120 125 | |
| aat tta tct gtt gat gtc ggc ttc gct cat tta cgt ggt aag aag aaa | 432 |
| Asn Leu Ser Val Asp Val Gly Phe Ala His Leu Arg Gly Lys Lys Lys | |
| 130 135 140 | |
| cat ttt gtt gag acc caa aat atc aag ggg tta ttg ctt gtt gag gcg | 480 |
| His Phe Val Glu Thr Gln Asn Ile Lys Gly Leu Leu Leu Val Glu Ala | |
| 145 150 155 160 | |
| gat tac acc act aaa gcc acc gct aac ctc tac ggt ttg aat cta aat | 528 |
| Asp Tyr Thr Thr Lys Ala Thr Ala Asn Leu Tyr Gly Leu Asn Leu Asn | |
| 165 170 175 | |
| tac cgt ttc | 537 |
| Tyr Arg Phe | |
| <210> 52 | |
| <211> 179 | |
| <212> PRT | |
| <213> Actinobacillus actinomycetemcomitans | |
| <400> 52 | |
| Gln His Asn Gly Val Leu Gly Pro Tyr Ile Gly Lys Gly Ser Leu Thr | |
| 1 5 10 15 | |
| Leu Lys Leu Pro Ala Tyr Trp Glu Leu Ser Gly Phe His Gln Leu Thr | |
| 20 25 30 | |
| Asp Gln Trp Ala Ile His Tyr Ser Tyr Lys Tyr Thr Glu Trp Ser Arg | |
| 35 40 45 | |
| Phe Lys Glu Leu Arg Gly Lys Tyr Gln Asp Gly Ser Gly Tyr Glu Ala | |
| 50 55 60 | |
| Phe Thr Lys Lys Glu Glu Tyr Lys Asp Asn Ser Arg Phe Ala Ile Gly | |
| 65 70 75 80 | |
| Thr Thr Tyr Ser Leu Asn Asp Ala Leu Thr Leu Arg Ala Gly Leu Ala | |

85

90

95

Tyr Asp Lys Ala Ala Ser Lys Thr His Leu Ser Ala Ser Ile Pro Asp
100 105 110

Thr Asp Arg Met Trp Tyr Ser Ile Gly Ala Thr Tyr Lys Phe Thr Pro
115 120 125

Asn Leu Ser Val Asp Val Gly Phe Ala His Leu Arg Gly Lys Lys Lys
130 135 140

His Phe Val Glu Thr Gln Asn Ile Lys Gly Leu Leu Leu Val Glu Ala
145 150 155 160

Asp Tyr Thr Thr Lys Ala Thr Ala Asn Leu Tyr Gly Leu Asn Leu Asn
165 170 175

Tyr Arg Phe

<210> 53
<211> 548
<212> DNA
<213> Actinobacillus actinomycetemcomitans

<220>
<221> CDS
<222> (1)..(546)

<400> 53
gga cca agt gtc acc aag gac ggc att cac gcc aat gat aag aaa atc 48
Gly Pro Ser Val Thr Lys Asp Gly Ile His Ala Asn Asp Lys Lys Ile
1 5 10 15

acc ggt gta aaa gac ggt gaa att tca gcc cat agt aaa gag gcg gtg 96
Thr Gly Val Lys Asp Gly Glu Ile Ser Ala His Ser Lys Glu Ala Val
20 25 30

aac ggt agc caa tta cat caa acc aac caa aat gtg acg aat tta gcc 144
Asn Gly Ser Gln Leu His Gln Thr Asn Gln Asn Val Thr Asn Leu Ala
35 40 45

aac aat gtg gac aaa ggg ctg aat ttc caa gga gac aat caa gaa gtc 192
Asn Asn Val Asp Lys Gly Leu Asn Phe Gln Gly Asp Asn Gln Glu Val
50 55 60

aca gtt aat cgt aaa tta ggc gat caa ctt aac att cgc ggc ggt gcg 240
Thr Val Asn Arg Lys Leu Gly Asp Gln Leu Asn Ile Arg Gly Gly Ala
65 70 75 80

gat ccg aag aaa tta aca caa aat aat atc ggc gtg acc gca gat aaa 288
 Asp Pro Lys Lys Leu Thr Gln Asn Asn Ile Gly Val Thr Ala Asp Lys
 85 90 95

aac ggc acc atg acc gtt cag ctg gcg aag gaa gtt aat ctc ggc gca 336
 Asn Gly Thr Met Thr Val Gln Leu Ala Lys Glu Val Asn Leu Gly Ala
 100 105 110

gat ggc agc ctt act gta ggc aat acc acg gtc aat aac gac ggt gtt 384
 Asp Gly Ser Leu Thr Val Gly Asn Thr Thr Val Asn Asn Asp Gly Val
 115 120 125

acg att aaa gac ggt cca agc atg aca agc cac ggc atc aac gcc ggc 432
 Thr Ile Lys Asp Gly Pro Ser Met Thr Ser His Gly Ile Asn Ala Gly
 130 135 140

ggc aaa cga att gct aac gtt gcg aaa ggg aaa gca ccg acg gat gca 480
 Gly Lys Arg Ile Ala Asn Val Ala Lys Gly Lys Ala Pro Thr Asp Ala
 145 150 155 160

gta aat atg agt cag ctt caa gac gtc ggc agt gcc att aat aat cgc 528
 Val Asn Met Ser Gln Leu Gln Asp Val Gly Ser Ala Ile Asn Asn Arg
 165 170 175

att gat aac att gat aag cg 548
 Ile Asp Asn Ile Asp Lys
 180

<210> 54
 <211> 182
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 54

Gly Pro Ser Val Thr Lys Asp Gly Ile His Ala Asn Asp Lys Lys Ile
 1 5 10 15

Thr Gly Val Lys Asp Gly Glu Ile Ser Ala His Ser Lys Glu Ala Val
 20 25 30

Asn Gly Ser Gln Leu His Gln Thr Asn Gln Asn Val Thr Asn Leu Ala
 35 40 45

Asn Asn Val Asp Lys Gly Leu Asn Phe Gln Gly Asp Asn Gln Glu Val
 50 55 60

Thr Val Asn Arg Lys Leu Gly Asp Gln Leu Asn Ile Arg Gly Gly Ala
 65 70 75 80

Asp Pro Lys Lys Leu Thr Gln Asn Asn Ile Gly Val Thr Ala Asp Lys

85

90

95

Asn Gly Thr Met Thr Val Gln Leu Ala Lys Glu Val Asn Leu Gly Ala
 100 105 110

Asp Gly Ser Leu Thr Val Gly Asn Thr Thr Val Asn Asn Asp Gly Val
 115 120 125

Thr Ile Lys Asp Gly Pro Ser Met Thr Ser His Gly Ile Asn Ala Gly
 130 135 140

Gly Lys Arg Ile Ala Asn Val Ala Lys Gly Lys Ala Pro Thr Asp Ala
 145 150 155 160

Val Asn Met Ser Gln Leu Gln Asp Val Gly Ser Ala Ile Asn Asn Arg
 165 170 175

Ile Asp Asn Ile Asp Lys
 180

<210> 55
 <211> 168
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1)..(168)

<400> 55
 atg gat cac ttt ccg ccg ctt tgg ctt ttt cgg tta aac agc tta atg 48
 Met Asp His Phe Pro Pro Leu Trp Leu Phe Arg Leu Asn Ser Leu Met
 1 5 10 15

ctt ctt ttg ctg ctt ctt ccg ttg cat aaa cct gtt caa aat cca ccg 96
 Leu Leu Leu Leu Leu Leu Pro Leu His Lys Pro Val Gln Asn Pro Pro
 20 25 30

tgc agt cag aac cgt caa tca ccg tac cca cct cga cac aac agc aaa 144
 Cys Ser Gln Asn Arg Gln Ser Pro Tyr Pro Pro Arg His Asn Ser Lys
 35 40 45

ctt ttg ctt ctt ccg cct gac att 168
 Leu Leu Leu Leu Pro Pro Asp Ile
 50 55

<210> 56
 <211> 56
 <212> PRT

<213> Actinobacillus actinomycetemcomitans

<400> 56

Met Asp His Phe Pro Pro Leu Trp Leu Phe Arg Leu Asn Ser Leu Met
1 5 10 15

Leu Leu Leu Leu Leu Leu Pro Leu His Lys Pro Val Gln Asn Pro Pro
20 25 30

Cys Ser Gln Asn Arg Gln Ser Pro Tyr Pro Pro Arg His Asn Ser Lys
35 40 45

Leu Leu Leu Leu Pro Pro Asp Ile
50 55

<210> 57

<211> 492

<212> DNA

<213> Actinobacillus actinomycetemcomitans

<220>

<221> CDS

<222> (1)..(492)

<400> 57

atg acg aac aaa cca aaa tcc ggg ctc tca ttt ttg tgg tta agt acg 48
Met Thr Asn Lys Pro Lys Ser Gly Leu Ser Phe Leu Trp Leu Ser Thr
1 5 10 15

ctg gca ttt atc gcc gat att ttt acc aaa tac tta atc gta agc cat 96
Leu Ala Phe Ile Ala Asp Ile Phe Thr Lys Tyr Leu Ile Val Ser His
20 25 30

ttt gaa tac ggc gaa agc gta aat atc ctg ccg att ttt aat ttg acc 144
Phe Glu Tyr Gly Glu Ser Val Asn Ile Leu Pro Ile Phe Asn Leu Thr
35 40 45

tat gtg ggt aac ttt ggc gcc gct ttt agt ttc ctg gcg gat cat gac 192
Tyr Val Gly Asn Phe Gly Ala Ala Phe Ser Phe Leu Ala Asp His Asp
50 55 60

ggc tgg caa aaa ttc ttt ttc ctt gcg ttg gca gtg ggg att tcc gcc 240
Gly Trp Gln Lys Phe Phe Phe Leu Ala Leu Ala Val Gly Ile Ser Ala
65 70 75 80

atg ttg gtt tat ttt tta atg aaa aat cgc cat gaa caa aaa ctg ctg 288
Met Leu Val Tyr Phe Leu Met Lys Asn Arg His Glu Gln Lys Leu Leu
85 90 95

aat gcc gcc tac gct ttg att atc ggc ggc gct ttg ggc aat gcg gcg 336
Asn Ala Ala Tyr Ala Leu Ile Ile Gly Gly Ala Leu Gly Asn Ala Ala
100 105 110

| | |
|---|-----|
| gat cgt ctg tat cac ggc tat gtg gtg gat ttt tta gat ttc tat tgg | 384 |
| Asp Arg Leu Tyr His Gly Tyr Val Val Asp Phe Leu Asp Phe Tyr Trp | |
| 115 120 125 | |
| | |
| cgg gat tgg cat tat ccc gtg ttt aac ctg gcg gat att gcc att tgt | 432 |
| Arg Asp Trp His Tyr Pro Val Phe Asn Leu Ala Asp Ile Ala Ile Cys | |
| 130 135 140 | |
| | |
| gtg ggt gcc ggt ttg att gcc ttg gat gcg ttc aaa aac ggc aat aaa | 480 |
| Val Gly Ala Gly Leu Ile Ala Leu Asp Ala Phe Lys Asn Gly Asn Lys | |
| 145 150 155 160 | |
| | |
| cag gaa tgt aaa | 492 |
| Gln Glu Cys Lys | |

<210> 58
 <211> 164
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

 <400> 58

| | |
|---|--|
| Met Thr Asn Lys Pro Lys Ser Gly Leu Ser Phe Leu Trp Leu Ser Thr | |
| 1 5 10 15 | |
| | |
| Leu Ala Phe Ile Ala Asp Ile Phe Thr Lys Tyr Leu Ile Val Ser His | |
| 20 25 30 | |
| | |
| Phe Glu Tyr Gly Glu Ser Val Asn Ile Leu Pro Ile Phe Asn Leu Thr | |
| 35 40 45 | |
| | |
| Tyr Val Gly Asn Phe Gly Ala Ala Phe Ser Phe Leu Ala Asp His Asp | |
| 50 55 60 | |
| | |
| Gly Trp Gln Lys Phe Phe Phe Leu Ala Leu Ala Val Gly Ile Ser Ala | |
| 65 70 75 80 | |
| | |
| Met Leu Val Tyr Phe Leu Met Lys Asn Arg His Glu Gln Lys Leu Leu | |
| 85 90 95 | |
| | |
| Asn Ala Ala Tyr Ala Leu Ile Ile Gly Gly Ala Leu Gly Asn Ala Ala | |
| 100 105 110 | |
| | |
| Asp Arg Leu Tyr His Gly Tyr Val Val Asp Phe Leu Asp Phe Tyr Trp | |
| 115 120 125 | |

Arg Asp Trp His Tyr Pro Val Phe Asn Leu Ala Asp Ile Ala Ile Cys
 130 135 140

Val Gly Ala Gly Leu Ile Ala Leu Asp Ala Phe Lys Asn Gly Asn Lys
 145 150 155 160

Gln Glu Cys Lys

<210> 59
 <211> 453
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1) .. (453)

<400> 59
 atg gct aaa ttg tat ttt tac tat tcc acc atg aat gca gga aaa tcc 48
 Met Ala Lys Leu Tyr Phe Tyr Tyr Ser Thr Met Asn Ala Gly Lys Ser
 1 5 10 15
 acc acc ttg ttg caa tct tcc tat aat tac cgc gaa cgt aac atg aac 96
 Thr Thr Leu Leu Gln Ser Ser Tyr Asn Tyr Arg Glu Arg Asn Met Asn
 20 25 30
 acg ctg gtt tat aca gcg gcg ata gac gat cgt ttc ggc gta ggg cag 144
 Thr Leu Val Tyr Thr Ala Ala Ile Asp Asp Arg Phe Gly Val Gly Gln
 35 40 45
 gtg act tcc cgc atc ggg att agc gaa cgg gcg aat acc ttt acc cgc 192
 Val Thr Ser Arg Ile Gly Ile Ser Glu Arg Ala Asn Thr Phe Thr Arg
 50 55 60
 aat acg aat ttg ttc gct gaa att gaa caa cat ctg gcg cag gag ccg 240
 Asn Thr Asn Leu Phe Ala Glu Ile Glu Gln His Leu Ala Gln Glu Pro
 65 70 75 80
 ctt cat tgt att ttg gtg gat gag gca cag ttt tta acc aaa gaa cag 288
 Leu His Cys Ile Leu Val Asp Glu Ala Gln Phe Leu Thr Lys Glu Gln
 85 90 95
 gtt tat caa ctg agc gat gtg gtg gat aaa cta cat att ccc gtg ttg 336
 Val Tyr Gln Leu Ser Asp Val Val Asp Lys Leu His Ile Pro Val Leu
 100 105 110
 tgc tac ggt ttg cgc acc gat ttc caa gcg gaa tta ttt gaa ggc agt 384
 Cys Tyr Gly Leu Arg Thr Asp Phe Gln Ala Glu Leu Phe Glu Gly Ser
 115 120 125
 cgc tat tta ctg gcg tgg gcg gat cag ctg gaa gaa ctc aaa acc att 432
 Arg Tyr Leu Leu Ala Trp Ala Asp Gln Leu Glu Glu Leu Lys Thr Ile
 130 135 140

tgt tac tgc ggt cgc aaa gcc
 Cys Tyr Cys Gly Arg Lys Ala
 145 150

<210> 60
 <211> 151
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 60

Met Ala Lys Leu Tyr Phe Tyr Tyr Ser Thr Met Asn Ala Gly Lys Ser
 1 5 10 15

Thr Thr Leu Leu Gln Ser Ser Tyr Asn Tyr Arg Glu Arg Asn Met Asn
 20 25 30

Thr Leu Val Tyr Thr Ala Ala Ile Asp Asp Arg Phe Gly Val Gly Gln
 35 40 45

Val Thr Ser Arg Ile Gly Ile Ser Glu Arg Ala Asn Thr Phe Thr Arg
 50 55 60

Asn Thr Asn Leu Phe Ala Glu Ile Glu Gln His Leu Ala Gln Glu Pro
 65 70 75 80

Leu His Cys Ile Leu Val Asp Glu Ala Gln Phe Leu Thr Lys Glu Gln
 85 90 95

Val Tyr Gln Leu Ser Asp Val Val Asp Lys Leu His Ile Pro Val Leu
 100 105 110

Cys Tyr Gly Leu Arg Thr Asp Phe Gln Ala Glu Leu Phe Glu Gly Ser
 115 120 125

Arg Tyr Leu Leu Ala Trp Ala Asp Gln Leu Glu Glu Leu Lys Thr Ile
 130 135 140

Cys Tyr Cys Gly Arg Lys Ala
 145 150

<210> 61
 <211> 643
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1)..(642)

<400> 61
 tat aac gaa aaa act tac gaa aat gac tta acc gca aaa gaa atc ttc 48
 Tyr Asn Glu Lys Thr Tyr Glu Asn Asp Leu Thr Ala Lys Glu Ile Phe
 1 5 10 15

gta act tat gta ttg aaa aac aaa ttg tta tgg tac atc gcc att gct 96
 Val Thr Tyr Val Leu Lys Asn Lys Leu Leu Trp Tyr Ile Ala Ile Ala
 20 25 30

aac gtg ttc gtt tac tta atc cgc tac ggc gta ttg aaa tgg tct ccg 144
 Asn Val Phe Val Tyr Leu Ile Arg Tyr Gly Val Leu Lys Trp Ser Pro
 35 40 45

gtt tac ttg agt gaa gtg aaa cac ttc aac atc aaa ggt acc gca tgg 192
 Val Tyr Leu Ser Glu Val Lys His Phe Asn Ile Lys Gly Thr Ala Trp
 50 55 60

gca tac acc att tat gaa ttg gcg gcc gtt ccg ggt aca tta ctt tgc 240
 Ala Tyr Thr Ile Tyr Glu Leu Ala Ala Val Pro Gly Thr Leu Leu Cys
 65 70 75 80

ggg tgg gta tct gac cat gta ttc aaa ggt aaa cgt ggc tta acc ggt 288
 Gly Trp Val Ser Asp His Val Phe Lys Gly Lys Arg Gly Leu Thr Gly
 85 90 95

ttc atc ttt atg att tta acc acc gca gcg gta gcc aca tac tgg atg 336
 Phe Ile Phe Met Ile Leu Thr Thr Ala Ala Val Ala Thr Tyr Trp Met
 100 105 110

aac cct gca aca ccg gaa gct gag ctt gca aac tac agc gca tgg tat 384
 Asn Pro Ala Thr Pro Glu Ala Glu Leu Ala Asn Tyr Ser Ala Trp Tyr
 115 120 125

gaa aac cca tac caa tta acc gac ttt att ttg atg acc tta atc ggt 432
 Glu Asn Pro Tyr Gln Leu Thr Asp Phe Ile Leu Met Thr Leu Ile Gly
 130 135 140

ttc tta atc tac ggc cct gtg atg cta atc ggc ttg cac gcc ctt gaa 480
 Phe Leu Ile Tyr Gly Pro Val Met Leu Ile Gly Leu His Ala Leu Glu
 145 150 155 160

ctt gca ccg aaa aaa gcg gca ggt acc gca gca ggt ttc acc ggt tta 528
 Leu Ala Pro Lys Lys Ala Ala Gly Thr Ala Ala Gly Phe Thr Gly Leu
 165 170 175

ttc ggt tac tta ggc ggt acc gtg tct gca tca gca gtt atc ggt tgg 576
 Phe Gly Tyr Leu Gly Gly Thr Val Ser Ala Ser Ala Val Ile Gly Trp
 180 185 190

gca gcc caa cac tac ggc tgg gac ggc ggt ttt tac gtg atg atc ggc 624
 Ala Ala Gln His Tyr Gly Trp Asp Gly Gly Phe Tyr Val Met Ile Gly
 195 200 205

ggt ggt atc tta ccg gtc a
 Gly Gly Ile Leu Pro Val
 210

643

<210> 62
 <211> 214
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 62

Tyr Asn Glu Lys Thr Tyr Glu Asn Asp Leu Thr Ala Lys Glu Ile Phe
 1 5 10 15

Val Thr Tyr Val Leu Lys Asn Lys Leu Leu Trp Tyr Ile Ala Ile Ala
 20 25 30

Asn Val Phe Val Tyr Leu Ile Arg Tyr Gly Val Leu Lys Trp Ser Pro
 35 40 45

Val Tyr Leu Ser Glu Val Lys His Phe Asn Ile Lys Gly Thr Ala Trp
 50 55 60

Ala Tyr Thr Ile Tyr Glu Leu Ala Ala Val Pro Gly Thr Leu Leu Cys
 65 70 75 80

Gly Trp Val Ser Asp His Val Phe Lys Gly Lys Arg Gly Leu Thr Gly
 85 90 95

Phe Ile Phe Met Ile Leu Thr Thr Ala Ala Val Ala Thr Tyr Trp Met
 100 105 110

Asn Pro Ala Thr Pro Glu Ala Glu Leu Ala Asn Tyr Ser Ala Trp Tyr
 115 120 125

Glu Asn Pro Tyr Gln Leu Thr Asp Phe Ile Leu Met Thr Leu Ile Gly
 130 135 140

Phe Leu Ile Tyr Gly Pro Val Met Leu Ile Gly Leu His Ala Leu Glu
 145 150 155 160

Leu Ala Pro Lys Lys Ala Ala Gly Thr Ala Ala Gly Phe Thr Gly Leu
 165 170 175

Phe Gly Tyr Leu Gly Gly Thr Val Ser Ala Ser Ala Val Ile Gly Trp
180 185 190

Ala Ala Gln His Tyr Gly Trp Asp Gly Gly Phe Tyr Val Met Ile Gly
195 200 205

Gly Gly Ile Leu Pro Val
210

<210> 63
<211> 333
<212> DNA
<213> Actinobacillus actinomycetemcomitans

<220>
<221> CDS
<222> (1) .. (333)

<400> 63
gaa tgg gcg gga acg cct tat cgt atc ggc gga caa agt cgc agt ggc 48
Glu Trp Ala Gly Thr Pro Tyr Arg Ile Gly Gly Gln Ser Arg Ser Gly
1 5 10 15
gtg gat tgc tcc ggt ttc gtg caa acc acc ttt ttc gat cgc ttc ggc 96
Val Asp Cys Ser Gly Phe Val Gln Thr Thr Phe Phe Asp Arg Phe Gly
20 25 30
ata aaa ttg ccg cga caa acc aaa gat cag gca aat tac ggt cag tat 144
Ile Lys Leu Pro Arg Gln Thr Lys Asp Gln Ala Asn Tyr Gly Gln Tyr
35 40 45
att gaa aaa ggc gat att caa acc ggt gat ttg gtg ttc ttt aaa acc 192
Ile Glu Lys Gly Asp Ile Gln Thr Gly Asp Leu Val Phe Phe Lys Thr
50 55 60
ggc cgc ggt cct cat ggc tat cat gtg ggc att tat gtg aag gaa gac 240
Gly Arg Gly Pro His Gly Tyr His Val Gly Ile Tyr Val Lys Glu Asp
65 70 75 80
aaa ttt ctg cac gcg tct act aag ggt ggc gtg att tat tcc tcg ttg 288
Lys Phe Leu His Ala Ser Thr Lys Gly Gly Val Ile Tyr Ser Ser Leu
85 90 95
aac agc gat tat tgg cgt aag gca tat tgg cag gca aga cga att 333
Asn Ser Asp Tyr Trp Arg Lys Ala Tyr Trp Gln Ala Arg Arg Ile
100 105 110

<210> 64
<211> 111
<212> PRT
<213> Actinobacillus actinomycetemcomitans

<400> 64

Glu Trp Ala Gly Thr Pro Tyr Arg Ile Gly Gly Gln Ser Arg Ser Gly
1 5 10 15

Val Asp Cys Ser Gly Phe Val Gln Thr Thr Phe Phe Asp Arg Phe Gly
20 25 30

Ile Lys Leu Pro Arg Gln Thr Lys Asp Gln Ala Asn Tyr Gly Gln Tyr
35 40 45

Ile Glu Lys Gly Asp Ile Gln Thr Gly Asp Leu Val Phe Phe Lys Thr
50 55 60

Gly Arg Gly Pro His Gly Tyr His Val Gly Ile Tyr Val Lys Glu Asp
65 70 75 80

Lys Phe Leu His Ala Ser Thr Lys Gly Gly Val Ile Tyr Ser Ser Leu
85 90 95

Asn Ser Asp Tyr Trp Arg Lys Ala Tyr Trp Gln Ala Arg Arg Ile
100 105 110

<210> 65
<211> 423
<212> DNA
<213> Actinobacillus actinomycetemcomitans

<220>
<221> CDS
<222> (1) .. (423)

<400> 65
atg aaa aaa cgt tgc aca tgg gcg gaa aac tca caa att tat cag gat 48
Met Lys Lys Arg Cys Thr Trp Ala Glu Asn Ser Gln Ile Tyr Gln Asp
1 5 10 15

tac cac gac aac gaa tgg ggt aaa cca caa ttt gat gat cgc aaa tta 96
Tyr His Asp Asn Glu Trp Gly Lys Pro Gln Phe Asp Asp Arg Lys Leu
20 25 30

ttt gaa aaa ctg tgt ctg gaa ggg cag caa gcg ggc ctg tcg tgg att 144
Phe Glu Lys Leu Cys Leu Glu Gly Gln Gln Ala Gly Leu Ser Trp Ile
35 40 45

acg gta tta aaa aaa cgg gaa gct tat cgg cag gcg ttt ttc cat ttt 192
Thr Val Leu Lys Lys Arg Glu Ala Tyr Arg Gln Ala Phe Phe His Phe
50 55 60

gat ccg cac aaa gtc gca gca atg act gat gcc gat atc gat cac tgt 240
Asp Pro His Lys Val Ala Ala Met Thr Asp Ala Asp Ile Asp His Cys

| 65 | 70 | 75 | 80 | |
|---|-----|-----|-----|-----|
| atg caa aat aca ggc tta att cgc cat cgc gct aaa tta cag gca atc | | | | 288 |
| Met Gln Asn Thr Gly Leu Ile Arg His Arg Ala Lys Leu Gln Ala Ile | 85 | 90 | 95 | |
| gtc acc aat gcg cgg gcg ttt ctt gcc atg caa aag tgc ggt gaa aat | | | | 336 |
| Val Thr Asn Ala Arg Ala Phe Leu Ala Met Gln Lys Cys Gly Glu Asn | 100 | 105 | 110 | |
| ttc agt cat ttt att tgg tct ttc gtg aat cat cag ccg caa att cat | | | | 384 |
| Phe Ser His Phe Ile Trp Ser Phe Val Asn His Gln Pro Gln Ile His | 115 | 120 | 125 | |
| gac gtg ccc gag tta agc cat gtg ccg gcg caa acg gca | | | | 423 |
| Asp Val Pro Glu Leu Ser His Val Pro Ala Gln Thr Ala | 130 | 135 | 140 | |

<210> 66
 <211> 141
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

 <400> 66

| | | | | |
|---|-----|-----|-----|----|
| Met Lys Lys Arg Cys Thr Trp Ala Glu Asn Ser Gln Ile Tyr Gln Asp | 1 | 5 | 10 | 15 |
| Tyr His Asp Asn Glu Trp Gly Lys Pro Gln Phe Asp Asp Arg Lys Leu | 20 | 25 | 30 | |
| Phe Glu Lys Leu Cys Leu Glu Gly Gln Gln Ala Gly Leu Ser Trp Ile | 35 | 40 | 45 | |
| Thr Val Leu Lys Lys Arg Glu Ala Tyr Arg Gln Ala Phe Phe His Phe | 50 | 55 | 60 | |
| Asp Pro His Lys Val Ala Ala Met Thr Asp Ala Asp Ile Asp His Cys | 65 | 70 | 75 | 80 |
| Met Gln Asn Thr Gly Leu Ile Arg His Arg Ala Lys Leu Gln Ala Ile | 85 | 90 | 95 | |
| Val Thr Asn Ala Arg Ala Phe Leu Ala Met Gln Lys Cys Gly Glu Asn | 100 | 105 | 110 | |
| Phe Ser His Phe Ile Trp Ser Phe Val Asn His Gln Pro Gln Ile His | 115 | 120 | 125 | |

Asp Val Pro Glu Leu Ser His Val Pro Ala Gln Thr Ala
 130 135 140

<210> 67
 <211> 375
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1)..(375)

<400> 67
 gac atc gtt aca ttt acc caa aaa cgc tgc ccg ttt aat cac atg acg 48
 Asp Ile Val Thr Phe Thr Gln Lys Arg Cys Pro Phe Asn His Met Thr
 1 5 10 15
 gtg gcg tat caa aaa agt gcg gtc ata aat tgc ggc gga tat gag gat 96
 Val Ala Tyr Gln Lys Ser Ala Val Ile Asn Cys Gly Gly Tyr Glu Asp
 20 25 30
 tta cag gaa gat tat tat ttg tgg atc aaa ctg gtg gcg caa ggg cag 144
 Leu Gln Glu Asp Tyr Tyr Leu Trp Ile Lys Leu Val Ala Gln Gly Gln
 35 40 45
 cgc gta gca aat tta ccc gat att ttg gtc tat gcg cgc gtc ggc aac 192
 Arg Val Ala Asn Leu Pro Asp Ile Leu Val Tyr Ala Arg Val Gly Asn
 50 55 60
 ggc atg gta ggg cga cgc cgt ggt tta aac caa gcc aaa gcg gaa tgg 240
 Gly Met Val Gly Arg Arg Arg Gly Leu Asn Gln Ala Lys Ala Glu Trp
 65 70 75 80
 cgc tta ttt aag cta aaa cac cat ctt ggc att cag gga ttt tta tcc 288
 Arg Leu Phe Lys Leu Lys His His Leu Gly Ile Gln Gly Phe Leu Ser
 85 90 95
 ggg cta ttc act ttt gtc ctg cgt tcc ggt gcc aga tta ttg ccg aca 336
 Gly Leu Phe Thr Phe Val Leu Arg Ser Gly Ala Arg Leu Leu Pro Thr
 100 105 110
 tca tta ctg aaa aac atc tat caa acc ttt tta aga aaa 375
 Ser Leu Leu Lys Asn Ile Tyr Gln Thr Phe Leu Arg Lys
 115 120 125

<210> 68
 <211> 125
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 68
 Asp Ile Val Thr Phe Thr Gln Lys Arg Cys Pro Phe Asn His Met Thr
 1 5 10 15

Val Ala Tyr Gln Lys Ser Ala Val Ile Asn Cys Gly Gly Tyr Glu Asp
20 25 30

Leu Gln Glu Asp Tyr Tyr Leu Trp Ile Lys Leu Val Ala Gln Gly Gln
35 40 45

Arg Val Ala Asn Leu Pro Asp Ile Leu Val Tyr Ala Arg Val Gly Asn
50 55 60

Gly Met Val Gly Arg Arg Arg Gly Leu Asn Gln Ala Lys Ala Glu Trp
65 70 75 80

Arg Leu Phe Lys Leu Lys His His Leu Gly Ile Gln Gly Phe Leu Ser
85 90 95

Gly Leu Phe Thr Phe Val Leu Arg Ser Gly Ala Arg Leu Leu Pro Thr
100 105 110

Ser Leu Leu Lys Asn Ile Tyr Gln Thr Phe Leu Arg Lys
115 120 125

<210> 69
<211> 1005
<212> DNA
<213> Actinobacillus actinomycetemcomitans

<220>
<221> CDS
<222> (1)..(1005)

<400> 69
tcc ggt aaa tcc gtc ggc gta aat acc atg att tta agc ctg ctt tac 48
Ser Gly Lys Ser Val Gly Val Asn Thr Met Ile Leu Ser Leu Leu Tyr
1 5 10 15

cgc gtt aaa ccg gaa gaa gtg aaa ttc atc atg att gac ccg aaa gtg 96
Arg Val Lys Pro Glu Glu Val Lys Phe Ile Met Ile Asp Pro Lys Val
20 25 30

gtg gaa ttg tct att tat aat gat att ccg cat ctt tta acg gaa gtg 144
Val Glu Leu Ser Ile Tyr Asn Asp Ile Pro His Leu Leu Thr Glu Val
35 40 45

gtc acg gac atg aaa aaa gcg gca aac gcg ttg cgc tgg tgt gta gac 192
Val Thr Asp Met Lys Lys Ala Ala Asn Ala Leu Arg Trp Cys Val Asp
50 55 60

gaa atg gag cgc cgt tat caa tta ttg tct gct ttg cgg gtg cgt aat 240

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Glu | Met | Glu | Arg | Arg | Tyr | Gln | Leu | Leu | Ser | Ala | Leu | Arg | Val | Arg | Asn | |
| 65 | | | | | 70 | | | | | 75 | | | | | 80 | |
| att | gaa | gga | ttt | aac | gag | aaa | gtt | gat | gaa | tat | gag | gcc | tta | aat | atg | 288 |
| Ile | Glu | Gly | Phe | Asn | Glu | Lys | Val | Asp | Glu | Tyr | Glu | Ala | Leu | Asn | Met | |
| | | | | 85 | | | | | 90 | | | | | 95 | | |
| ccg | att | ccg | aac | ccg | tta | tgg | aag | ccg | ggc | gat | tcc | atg | gat | act | ttg | 336 |
| Pro | Ile | Pro | Asn | Pro | Leu | Trp | Lys | Pro | Gly | Asp | Ser | Met | Asp | Thr | Leu | |
| | | | 100 | | | | | 105 | | | | | 110 | | | |
| ccg | cca | cca | tta | gaa | aaa | ctg | agt | tac | att | gtg | gtg | att | gtg | gat | gaa | 384 |
| Pro | Pro | Pro | Leu | Glu | Lys | Leu | Ser | Tyr | Ile | Val | Val | Ile | Val | Asp | Glu | |
| | | | 115 | | | | 120 | | | | | 125 | | | | |
| ttc | gcc | gat | ttg | atg | atg | gtg | gca | ggc | aaa | cag | gtg | gaa | gag | ctt | atc | 432 |
| Phe | Ala | Asp | Leu | Met | Met | Val | Ala | Gly | Lys | Gln | Val | Glu | Glu | Leu | Ile | |
| | 130 | | | | | 135 | | | | | 140 | | | | | |
| gca | cgt | ttg | gcg | caa | aaa | gcc | cgt | gcg | gtg | ggg | att | cac | tta | att | ttg | 480 |
| Ala | Arg | Leu | Ala | Gln | Lys | Ala | Arg | Ala | Val | Gly | Ile | His | Leu | Ile | Leu | |
| 145 | | | | | 150 | | | | | 155 | | | | | 160 | |
| gca | acc | caa | cgc | cct | tcc | gta | gat | gtg | att | acc | ggg | ttg | att | aaa | gcg | 528 |
| Ala | Thr | Gln | Arg | Pro | Ser | Val | Asp | Val | Ile | Thr | Gly | Leu | Ile | Lys | Ala | |
| | | | | 165 | | | | 170 | | | | | | 175 | | |
| aac | gta | ccg | agt | cga | att | gcg | ttt | act | gtg | gcg | act | aaa | att | gac | tcg | 576 |
| Asn | Val | Pro | Ser | Arg | Ile | Ala | Phe | Thr | Val | Ala | Thr | Lys | Ile | Asp | Ser | |
| | | | 180 | | | | | 185 | | | | | 190 | | | |
| cgt | act | att | ctt | gat | gca | ggc | ggg | gcg | gaa | tcc | tta | ttg | ggg | aaa | ggg | 624 |
| Arg | Thr | Ile | Leu | Asp | Ala | Gly | Gly | Ala | Glu | Ser | Leu | Leu | Gly | Lys | Gly | |
| | | 195 | | | | | 200 | | | | | 205 | | | | |
| gat | atg | ctg | tat | tcc | cca | cag | ggg | tct | acc | gaa | tta | gtc | cg | att | cac | 672 |
| Asp | Met | Leu | Tyr | Ser | Pro | Gln | Gly | Ser | Thr | Glu | Leu | Val | Arg | Ile | His | |
| | 210 | | | | | 215 | | | | | 220 | | | | | |
| ggg | gcc | ttt | atg | act | gat | gac | gaa | gtc | gtg | cg | gtg | gta | gat | gat | tgg | 720 |
| Gly | Ala | Phe | Met | Thr | Asp | Asp | Glu | Val | Val | Arg | Val | Val | Asp | Asp | Trp | |
| 225 | | | | | 230 | | | | | 235 | | | | | 240 | |
| aaa | gca | cg | ggg | aaa | ccg | aat | tac | att | gat | ggg | att | tta | gag | ggg | gat | 768 |
| Lys | Ala | Arg | Gly | Lys | Pro | Asn | Tyr | Ile | Asp | Gly | Ile | Leu | Glu | Gly | Asp | |
| | | | | 245 | | | | | 250 | | | | | 255 | | |
| gaa | gaa | gat | gcc | ggg | gcg | gaa | cg | tta | agt | gag | cg | ggc | ggc | gaa | acc | 816 |
| Glu | Glu | Asp | Ala | Gly | Ala | Glu | Arg | Leu | Ser | Glu | Arg | Gly | Gly | Glu | Thr | |
| | | | 260 | | | | | 265 | | | | | 270 | | | |
| gac | ggg | ttg | ttt | gat | gaa | gtg | gta | gag | ttt | gtg | gtc | agc | aca | ggc | acc | 864 |
| Asp | Gly | Leu | Phe | Asp | Glu | Val | Val | Glu | Phe | Val | Val | Ser | Thr | Gly | Thr | |
| | | 275 | | | | | 280 | | | | | 285 | | | | |
| acg | tct | att | tct | gcg | att | caa | cg | cgt | ttc | cga | gta | ggc | ttt | aac | cgt | 912 |
| Thr | Ser | Ile | Ser | Ala | Ile | Gln | Arg | Arg | Phe | Arg | Val | Gly | Phe | Asn | Arg | |

290 295 300
 gcc gcc aat att atg gat cag ctg gaa gag cag ggc att gtt tcg ccg 960
 Ala Ala Asn Ile Met Asp Gln Leu Glu Glu Gln Gly Ile Val Ser Pro
 305 310 315 320

 gtg caa aac ggt aaa cgt gaa gtg ttg gcg cgc agt gcg gat tat 1005
 Val Gln Asn Gly Lys Arg Glu Val Leu Ala Arg Ser Ala Asp Tyr
 325 330 335

 <210> 70
 <211> 335
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

 <400> 70

 Ser Gly Lys Ser Val Gly Val Asn Thr Met Ile Leu Ser Leu Leu Tyr
 1 5 10 15

 Arg Val Lys Pro Glu Glu Val Lys Phe Ile Met Ile Asp Pro Lys Val
 20 25 30

 Val Glu Leu Ser Ile Tyr Asn Asp Ile Pro His Leu Leu Thr Glu Val
 35 40 45

 Val Thr Asp Met Lys Lys Ala Ala Asn Ala Leu Arg Trp Cys Val Asp
 50 55 60

 Glu Met Glu Arg Arg Tyr Gln Leu Leu Ser Ala Leu Arg Val Arg Asn
 65 70 75 80

 Ile Glu Gly Phe Asn Glu Lys Val Asp Glu Tyr Glu Ala Leu Asn Met
 85 90 95

 Pro Ile Pro Asn Pro Leu Trp Lys Pro Gly Asp Ser Met Asp Thr Leu
 100 105 110

 Pro Pro Pro Leu Glu Lys Leu Ser Tyr Ile Val Val Ile Val Asp Glu
 115 120 125

 Phe Ala Asp Leu Met Met Val Ala Gly Lys Gln Val Glu Glu Leu Ile
 130 135 140

 Ala Arg Leu Ala Gln Lys Ala Arg Ala Val Gly Ile His Leu Ile Leu
 145 150 155 160

Ala Thr Gln Arg Pro Ser Val Asp Val Ile Thr Gly Leu Ile Lys Ala
 165 170 175

Asn Val Pro Ser Arg Ile Ala Phe Thr Val Ala Thr Lys Ile Asp Ser
 180 185 190

Arg Thr Ile Leu Asp Ala Gly Gly Ala Glu Ser Leu Leu Gly Lys Gly
 195 200 205

Asp Met Leu Tyr Ser Pro Gln Gly Ser Thr Glu Leu Val Arg Ile His
 210 215 220

Gly Ala Phe Met Thr Asp Asp Glu Val Val Arg Val Val Asp Asp Trp
 225 230 235 240

Lys Ala Arg Gly Lys Pro Asn Tyr Ile Asp Gly Ile Leu Glu Gly Asp
 245 250 255

Glu Glu Asp Ala Gly Ala Glu Arg Leu Ser Glu Arg Gly Gly Glu Thr
 260 265 270

Asp Gly Leu Phe Asp Glu Val Val Glu Phe Val Val Ser Thr Gly Thr
 275 280 285

Thr Ser Ile Ser Ala Ile Gln Arg Arg Phe Arg Val Gly Phe Asn Arg
 290 295 300

Ala Ala Asn Ile Met Asp Gln Leu Glu Glu Gln Gly Ile Val Ser Pro
 305 310 315 320

Val Gln Asn Gly Lys Arg Glu Val Leu Ala Arg Ser Ala Asp Tyr
 325 330 335

<210> 71
 <211> 426
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1) .. (426)

<400> 71
 atg tcg cct aat tat cct tat att aaa aca ttg gtt ata ttt cct ctg
 Met Ser Pro Asn Tyr Pro Tyr Ile Lys Thr Leu Val Ile Phe Pro Leu

48

| 1 | 5 | 10 | 15 | |
|---|---|-----|-----|-----|
| ctt gct caa ctt atc ggc acc atc atc agc att tgt gtg gat gac aat | | | | 96 |
| Leu Ala Gln Leu Ile Gly Thr Ile Ile Ser Ile Cys Val Asp Asp Asn | | | | |
| 20 | | 25 | 30 | |
| act gac agt ttt ctc ggc act gcc gac gtg atc ctt ttt agt ctg tta | | | | 144 |
| Thr Asp Ser Phe Leu Gly Thr Ala Asp Val Ile Leu Phe Ser Leu Leu | | | | |
| 35 | | 40 | 45 | |
| tcg act ttt atc gtg gca acc gtg ccc gct ttt ttg att gca ctg tgg | | | | 192 |
| Ser Thr Phe Ile Val Ala Thr Val Pro Ala Phe Leu Ile Ala Leu Trp | | | | |
| 50 | | 55 | 60 | |
| aca aaa att tat cgc tat acg cgc tat aac atg atg gcg att gtg tta | | | | 240 |
| Thr Lys Ile Tyr Arg Tyr Thr Arg Tyr Asn Met Met Ala Ile Val Leu | | | | |
| 65 | | 70 | 75 | 80 |
| atc tcg ctg att atc gct ttt tgt tat ggc aac gta gct agc ttt atc | | | | 288 |
| Ile Ser Leu Ile Ile Ala Phe Cys Tyr Gly Asn Val Ala Ser Phe Ile | | | | |
| 85 | | 90 | 95 | |
| tac atg acg ttc tct cag cca aac atg acg ttt ggt att tgg ctg cgt | | | | 336 |
| Tyr Met Thr Phe Ser Gln Pro Asn Met Thr Phe Gly Ile Trp Leu Arg | | | | |
| 100 | | 105 | 110 | |
| agc ggc ggc att gat atg gcg ttt tta ctg agt ttc ggc atg gcg ttg | | | | 384 |
| Ser Gly Gly Ile Asp Met Ala Phe Leu Leu Ser Phe Gly Met Ala Leu | | | | |
| 115 | | 120 | 125 | |
| tat tca gtt ctt gtc ttg cct ttg ttg tta ccg caa acc aga | | | | 426 |
| Tyr Ser Val Leu Val Leu Pro Leu Leu Leu Pro Gln Thr Arg | | | | |
| 130 | | 135 | 140 | |

<210> 72
 <211> 142
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 72

| | | | | |
|---|---|----|----|--|
| Met Ser Pro Asn Tyr Pro Tyr Ile Lys Thr Leu Val Ile Phe Pro Leu | | | | |
| 1 | 5 | 10 | 15 | |
| Leu Ala Gln Leu Ile Gly Thr Ile Ile Ser Ile Cys Val Asp Asp Asn | | | | |
| 20 | | 25 | 30 | |
| Thr Asp Ser Phe Leu Gly Thr Ala Asp Val Ile Leu Phe Ser Leu Leu | | | | |
| 35 | | 40 | 45 | |
| Ser Thr Phe Ile Val Ala Thr Val Pro Ala Phe Leu Ile Ala Leu Trp | | | | |
| 50 | | 55 | 60 | |

Thr Lys Ile Tyr Arg Tyr Thr Arg Tyr Asn Met Met Ala Ile Val Leu
65 70 75 80

Ile Ser Leu Ile Ile Ala Phe Cys Tyr Gly Asn Val Ala Ser Phe Ile
85 90 95

Tyr Met Thr Phe Ser Gln Pro Asn Met Thr Phe Gly Ile Trp Leu Arg
100 105 110

Ser Gly Gly Ile Asp Met Ala Phe Leu Leu Ser Phe Gly Met Ala Leu
115 120 125

Tyr Ser Val Leu Val Leu Pro Leu Leu Leu Pro Gln Thr Arg
130 135 140

<210> 73
<211> 600
<212> DNA
<213> Actinobacillus actinomycetemcomitans

<220>
<221> CDS
<222> (1)..(600)

<400> 73
gta tct caa caa aac cgc tgc gga ttc cac cac gga ttc aat aat gaa 48
Val Ser Gln Gln Asn Arg Cys Gly Phe His His Gly Phe Asn Asn Glu
1 5 10 15

aga gga aaa ata atc atg ttg gca aga atg tta ttt caa tcc tgg cgt 96
Arg Gly Lys Ile Ile Met Leu Ala Arg Met Leu Phe Gln Ser Trp Arg
20 25 30

tat gat tta aag cgc aaa ctc ctc gcc att gtg acc att ttc ctc gct 144
Tyr Asp Leu Lys Arg Lys Leu Leu Ala Ile Val Thr Ile Phe Leu Ala
35 40 45

gcc gga tta att tcc gcc ttg ctt gcg gtg tcc atc gac atc ggc gac 192
Ala Gly Leu Ile Ser Ala Leu Leu Ala Val Ser Ile Asp Ile Gly Asp
50 55 60

aaa atg gcg aaa gag ctt aaa tcc tac ggc gcc aat att ctg gtg gag 240
Lys Met Ala Lys Glu Leu Lys Ser Tyr Gly Ala Asn Ile Leu Val Glu
65 70 75 80

ccc gcc agc agc gcc att ttg cct gat gaa gtg agc cgt aat aat tct 288
Pro Ala Ser Ser Ala Ile Leu Pro Asp Glu Val Ser Arg Asn Asn Ser
85 90 95

ctc gcc acg caa gat ttt ttg gac gaa aaa gaa ctg ccg aac att aaa 336
Leu Ala Thr Gln Asp Phe Leu Asp Glu Lys Glu Leu Pro Asn Ile Lys

| 100 | 105 | 110 | |
|---|-----|-----|-----|
| gac att ttt tgg cgt aac aat att gta ggc ttc gcc ccg tta ctc agc | | | 384 |
| Asp Ile Phe Trp Arg Asn Asn Ile Val Gly Phe Ala Pro Leu Leu Ser | | | |
| 115 | 120 | 125 | |
| gca caa gtc aaa gcc gat gga cca aac ggc aag gcg caa gac atc gac | | | 432 |
| Ala Gln Val Lys Ala Asp Gly Pro Asn Gly Lys Ala Gln Asp Ile Asp | | | |
| 130 | 135 | 140 | |
| att ctc ggc acg ttt ttt gat cat caa atc gcc gtg ccg gat gaa gac | | | 480 |
| Ile Leu Gly Thr Phe Phe Asp His Gln Ile Ala Val Pro Asp Glu Asp | | | |
| 145 | 150 | 155 | 160 |
| gat tac cac acc ggg caa aaa atc atc aac cct tat tgg cag gtg gaa | | | 528 |
| Asp Tyr His Thr Gly Gln Lys Ile Ile Asn Pro Tyr Trp Gln Val Glu | | | |
| 165 | 170 | 175 | |
| ggc gaa tgg gtg aac gat gcc acc gat gat ttc agc gaa cag gtt cct | | | 576 |
| Gly Glu Trp Val Asn Asp Ala Thr Asp Asp Phe Ser Glu Gln Val Pro | | | |
| 180 | 185 | 190 | |
| gcg tta ctc ggc gca caa ctt gcc | | | 600 |
| Ala Leu Leu Gly Ala Gln Leu Ala | | | |
| 195 | 200 | | |

<210> 74
 <211> 200
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans
 <400> 74

| | | |
|---|----|-------|
| Val Ser Gln Gln Asn Arg Cys Gly Phe His His Gly Phe Asn Asn Glu | | |
| 1 | 5 | 10 15 |
| Arg Gly Lys Ile Ile Met Leu Ala Arg Met Leu Phe Gln Ser Trp Arg | | |
| 20 | 25 | 30 |
| Tyr Asp Leu Lys Arg Lys Leu Leu Ala Ile Val Thr Ile Phe Leu Ala | | |
| 35 | 40 | 45 |
| Ala Gly Leu Ile Ser Ala Leu Leu Ala Val Ser Ile Asp Ile Gly Asp | | |
| 50 | 55 | 60 |
| Lys Met Ala Lys Glu Leu Lys Ser Tyr Gly Ala Asn Ile Leu Val Glu | | |
| 65 | 70 | 75 80 |
| Pro Ala Ser Ser Ala Ile Leu Pro Asp Glu Val Ser Arg Asn Asn Ser | | |
| 85 | 90 | 95 |

Leu Ala Thr Gln Asp Phe Leu Asp Glu Lys Glu Leu Pro Asn Ile Lys
100 105 110

Asp Ile Phe Trp Arg Asn Asn Ile Val Gly Phe Ala Pro Leu Leu Ser
115 120 125

Ala Gln Val Lys Ala Asp Gly Pro Asn Gly Lys Ala Gln Asp Ile Asp
130 135 140

Ile Leu Gly Thr Phe Phe Asp His Gln Ile Ala Val Pro Asp Glu Asp
145 150 155 160

Asp Tyr His Thr Gly Gln Lys Ile Ile Asn Pro Tyr Trp Gln Val Glu
165 170 175

Gly Glu Trp Val Asn Asp Ala Thr Asp Asp Phe Ser Glu Gln Val Pro
180 185 190

Ala Leu Leu Gly Ala Gln Leu Ala
195 200

<210> 75
<211> 603
<212> DNA
<213> Actinobacillus actinomycetemcomitans

<220>
<221> CDS
<222> (1)..(603)

<400> 75
gaa cct cga atc act gca ttg cac caa gaa aat caa ggc aaa gcc agt 48
Glu Pro Arg Ile Thr Ala Leu His Gln Glu Asn Gln Gly Lys Ala Ser
1 5 10 15

gca ttg aat cat ggt tta acg gtt gcc aag gga aaa tac gtt gcc tgt 96
Ala Leu Asn His Gly Leu Thr Val Ala Lys Gly Lys Tyr Val Ala Cys
20 25 30

atc gac ggt gat gcg gta ttg gat tac tac gcg ctg gac tac atg gtt 144
Ile Asp Gly Asp Ala Val Leu Asp Tyr Tyr Ala Leu Asp Tyr Met Val
35 40 45

caa gcc tta gag caa gat ccg aaa tat gct gct acc aca ggt aat ccg 192
Gln Ala Leu Glu Gln Asp Pro Lys Tyr Ala Ala Thr Thr Gly Asn Pro
50 55 60

cgt gta cgt aac cgt agt act att ttg ggg cgt tta cag gta tcc gag 240
Arg Val Arg Asn Arg Ser Thr Ile Leu Gly Arg Leu Gln Val Ser Glu

| 65 | 70 | 75 | 80 | |
|---|-----|-----|-----|-----|
| ttc agc tcc atc atc ggt cta att aag cgg gca caa ggt cta atg ggc | | | | 288 |
| Phe Ser Ser Ile Ile Gly Leu Ile Lys Arg Ala Gln Gly Leu Met Gly | 85 | 90 | 95 | |
| aca atc ttt acc gtt tcc ggc gtg tgt tgt tta ttc cgt aaa gat gtc | | | | 336 |
| Thr Ile Phe Thr Val Ser Gly Val Cys Cys Leu Phe Arg Lys Asp Val | 100 | 105 | 110 | |
| atg gaa gaa atc ggt gga tgg agt act aac atg atc acc gaa gac att | | | | 384 |
| Met Glu Glu Ile Gly Gly Trp Ser Thr Asn Met Ile Thr Glu Asp Ile | 115 | 120 | 125 | |
| gat att agc tgg aaa att caa att gcc ggt tac aac atc atg tac gaa | | | | 432 |
| Asp Ile Ser Trp Lys Ile Gln Ile Ala Gly Tyr Asn Ile Met Tyr Glu | 130 | 135 | 140 | |
| cca cgc gca ctc tgc tgg gtg ctt atg ccg gaa agc ata aaa ggg ctt | | | | 480 |
| Pro Arg Ala Leu Cys Trp Val Leu Met Pro Glu Ser Ile Lys Gly Leu | 145 | 150 | 155 | 160 |
| tat aaa cag cgt ttg cgt tgg gca caa ggc ggt gcg gaa act atc atg | | | | 528 |
| Tyr Lys Gln Arg Leu Arg Trp Ala Gln Gly Gly Ala Glu Thr Ile Met | 165 | 170 | 175 | |
| aag tat ttt tcg aaa ata tgg cat tgg cgg aat cgt cgc ttg tgg cca | | | | 576 |
| Lys Tyr Phe Ser Lys Ile Trp His Trp Arg Asn Arg Arg Leu Trp Pro | 180 | 185 | 190 | |
| atg tat att gag tat ttt gct acc gtt | | | | 603 |
| Met Tyr Ile Glu Tyr Phe Ala Thr Val | 195 | 200 | | |

<210> 76
 <211> 201
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 76

| | | | | |
|---|----|--|----|----|
| Glu Pro Arg Ile Thr Ala Leu His Gln Glu Asn Gln Gly Lys Ala Ser | | | | |
| 1 | 5 | | 10 | 15 |
| Ala Leu Asn His Gly Leu Thr Val Ala Lys Gly Lys Tyr Val Ala Cys | | | | |
| | 20 | | 25 | 30 |
| Ile Asp Gly Asp Ala Val Leu Asp Tyr Tyr Ala Leu Asp Tyr Met Val | | | | |
| | 35 | | 40 | 45 |
| Gln Ala Leu Glu Gln Asp Pro Lys Tyr Ala Ala Thr Thr Gly Asn Pro | | | | |
| | 50 | | 55 | 60 |

Arg Val Arg Asn Arg Ser Thr Ile Leu Gly Arg Leu Gln Val Ser Glu
65 70 75 80

Phe Ser Ser Ile Ile Gly Leu Ile Lys Arg Ala Gln Gly Leu Met Gly
85 90 95

Thr Ile Phe Thr Val Ser Gly Val Cys Cys Leu Phe Arg Lys Asp Val
100 105 110

Met Glu Glu Ile Gly Gly Trp Ser Thr Asn Met Ile Thr Glu Asp Ile
115 120 125

Asp Ile Ser Trp Lys Ile Gln Ile Ala Gly Tyr Asn Ile Met Tyr Glu
130 135 140

Pro Arg Ala Leu Cys Trp Val Leu Met Pro Glu Ser Ile Lys Gly Leu
145 150 155 160

Tyr Lys Gln Arg Leu Arg Trp Ala Gln Gly Gly Ala Glu Thr Ile Met
165 170 175

Lys Tyr Phe Ser Lys Ile Trp His Trp Arg Asn Arg Arg Leu Trp Pro
180 185 190

Met Tyr Ile Glu Tyr Phe Ala Thr Val
195 200

<210> 77
<211> 759
<212> DNA
<213> Actinobacillus actinomycetemcomitans

<220>
<221> CDS
<222> (1) .. (759)

<400> 77
atg cga tat ttg aaa caa aca aca att tca ctg tta att ttg acc gca 48
Met Arg Tyr Leu Lys Gln Thr Thr Ile Ser Leu Leu Ile Leu Thr Ala
1 5 10 15

ctt tcc tcc tcc ttt gcc aat cag cac aag gcg aca acg cat aaa gcg 96
Leu Ser Ser Ser Phe Ala Asn Gln His Lys Ala Thr Thr His Lys Ala
20 25 30

aat gtt gcc cat acg cac gcc aaa ccg gag caa cac cac gca gaa tta 144
Asn Val Ala His Thr His Ala Lys Pro Glu Gln His His Ala Glu Leu

<212> PRT

<213> Actinobacillus actinomycetemcomitans

<400> 78

Met Arg Tyr Leu Lys Gln Thr Thr Ile Ser Leu Leu Ile Leu Thr Ala
1 5 10 15

Leu Ser Ser Ser Phe Ala Asn Gln His Lys Ala Thr Thr His Lys Ala
20 25 30

Asn Val Ala His Thr His Ala Lys Pro Glu Gln His His Ala Glu Leu
35 40 45

Glu Arg Leu Lys Gln Arg Ala Thr Phe Leu Gln Leu Glu Ser Leu Leu
50 55 60

Lys Ser Ala Val Lys Asn Asn Gly Val Phe Ile Asn Gln Thr Val Phe
65 70 75 80

Leu Lys Leu Ile Glu Asp Leu Lys Gly Tyr Pro Leu Gln Thr Asp Ala
85 90 95

Ile Ala Ala Tyr Phe Asp Ala Cys Ile Lys Ser Val Asn His Asp Thr
100 105 110

Ser Lys Gly Glu Val Lys Ala Leu Lys Gln Asp Ile Glu Gln Phe Ile
115 120 125

Glu Lys His Pro Thr His Phe Leu Arg Glu Lys Leu Glu Gln Arg Leu
130 135 140

Phe Thr Leu Phe Ile Asn Thr Glu Asp Leu Glu Gly Leu Val Gly Tyr
145 150 155 160

Ala Gln Arg Val Lys Pro Lys Gly Leu Glu Ala Gln Leu Ala Val Leu
165 170 175

Asn Ala Glu Tyr Gln Leu Gly Arg Lys Arg Ala Glu Ser Asp Lys Asn
180 185 190

Pro Asn Ala Asn Val Ser Lys Ile Ile Ala Arg Tyr Glu Gln Leu Trp
195 200 205

Leu Asn Asn Ser Glu Leu Pro Asn Asp Ala Gln Leu Arg Ala Lys Trp
 210 215 220

Tyr Ser Asp Gly Gly Arg Met Ala Glu Lys Val Tyr Gln Lys Ala Glu
 225 230 235 240

Asn Leu Phe Ile Lys Asn Asn Val Lys Gly Leu Glu Leu
 245 250

<210> 79
 <211> 624
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1) .. (624)

<400> 79
 gtc ggt caa tgg acg gag aaa ggt aac caa acg gaa aat cgc gat aat 48
 Val Gly Gln Trp Thr Glu Lys Gly Asn Gln Thr Glu Asn Arg Asp Asn
 1 5 10 15
 tcc gat ccg tcc ggt tta ggt tgt act ctt ggt tgg ggc ttt gca tgg 96
 Ser Asp Pro Ser Gly Leu Gly Cys Thr Leu Gly Trp Gly Phe Ala Trp
 20 25 30
 cca gca aac cgc cgc gtg ctt tat agc cgc gcc tct ttg gat att aac 144
 Pro Ala Asn Arg Arg Val Leu Tyr Ser Arg Ala Ser Leu Asp Ile Asn
 35 40 45
 ggt aat cct tgg gat aaa cac cgt caa ctg atc aaa tgg aac ggt aaa 192
 Gly Asn Pro Trp Asp Lys His Arg Gln Leu Ile Lys Trp Asn Gly Lys
 50 55 60
 aac tgg aac tgg ttt gat att gcc gac tac ggc act caa cca cca ggt 240
 Asn Trp Asn Trp Phe Asp Ile Ala Asp Tyr Gly Thr Gln Pro Pro Gly
 65 70 75 80
 tcc gat acc aga cca ttt atg atg tca gcc gaa ggt gtt gga cgc tta 288
 Ser Asp Thr Arg Pro Phe Met Met Ser Ala Glu Gly Val Gly Arg Leu
 85 90 95
 ttt gcc gtt gat aaa att aat agc gga ccg ttc ccg gaa cac tat gaa 336
 Phe Ala Val Asp Lys Ile Asn Ser Gly Pro Phe Pro Glu His Tyr Glu
 100 105 110
 ccg att gaa agt ccg att gat acg aat ccg ctt cat ccg aat gtg gta 384
 Pro Ile Glu Ser Pro Ile Asp Thr Asn Pro Leu His Pro Asn Val Val
 115 120 125
 tca gat ccg acg gtg cgt att tac aaa gaa gat cgc gag ttt atc ggc 432
 Ser Asp Pro Thr Val Arg Ile Tyr Lys Glu Asp Arg Glu Phe Ile Gly
 130 135 140

tca aat aaa gaa tat ccg ttt gtg gca aca act tat cgt cta acc gaa 480
 Ser Asn Lys Glu Tyr Pro Phe Val Ala Thr Thr Tyr Arg Leu Thr Glu
 145 150 155 160

cat ttc cac agt tgg acc gcg caa tct gcc att aac atc atc gca caa 528
 His Phe His Ser Trp Thr Ala Gln Ser Ala Ile Asn Ile Ile Ala Gln
 165 170 175

ccg caa caa ttt gtg gaa atc ggt gaa aaa ttg gca gaa gaa aaa ggt 576
 Pro Gln Gln Phe Val Glu Ile Gly Glu Lys Leu Ala Glu Glu Lys Gly
 180 185 190

atc caa aaa ggc gat atg gta cgt att acc tcc aaa cgg ggc tat att 624
 Ile Gln Lys Gly Asp Met Val Arg Ile Thr Ser Lys Arg Gly Tyr Ile
 195 200 205

<210> 80
 <211> 208
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 80

Val Gly Gln Trp Thr Glu Lys Gly Asn Gln Thr Glu Asn Arg Asp Asn
 1 5 10 15

Ser Asp Pro Ser Gly Leu Gly Cys Thr Leu Gly Trp Gly Phe Ala Trp
 20 25 30

Pro Ala Asn Arg Arg Val Leu Tyr Ser Arg Ala Ser Leu Asp Ile Asn
 35 40 45

Gly Asn Pro Trp Asp Lys His Arg Gln Leu Ile Lys Trp Asn Gly Lys
 50 55 60

Asn Trp Asn Trp Phe Asp Ile Ala Asp Tyr Gly Thr Gln Pro Pro Gly
 65 70 75 80

Ser Asp Thr Arg Pro Phe Met Met Ser Ala Glu Gly Val Gly Arg Leu
 85 90 95

Phe Ala Val Asp Lys Ile Asn Ser Gly Pro Phe Pro Glu His Tyr Glu
 100 105 110

Pro Ile Glu Ser Pro Ile Asp Thr Asn Pro Leu His Pro Asn Val Val
 115 120 125

Ser Asp Pro Thr Val Arg Ile Tyr Lys Glu Asp Arg Glu Phe Ile Gly
130 135 140

Ser Asn Lys Glu Tyr Pro Phe Val Ala Thr Thr Tyr Arg Leu Thr Glu
145 150 155 160

His Phe His Ser Trp Thr Ala Gln Ser Ala Ile Asn Ile Ile Ala Gln
165 170 175

Pro Gln Gln Phe Val Glu Ile Gly Glu Lys Leu Ala Glu Glu Lys Gly
180 185 190

Ile Gln Lys Gly Asp Met Val Arg Ile Thr Ser Lys Arg Gly Tyr Ile
195 200 205

<210> 81
<211> 534
<212> DNA
<213> Actinobacillus actinomycetemcomitans

<220>
<221> CDS
<222> (1) .. (534)

<400> 81
att cct ggc tta att gaa ggc gca tcg gaa gga gca ggc ttg ggt atc 48
Ile Pro Gly Leu Ile Glu Gly Ala Ser Glu Gly Ala Gly Leu Gly Ile
1 5 10 15

cgc ttc ctg aaa cac ttg gaa cgt tgc cgc gtg ttg att cat ttg gtg 96
Arg Phe Leu Lys His Leu Glu Arg Cys Arg Val Leu Ile His Leu Val
20 25 30

gat atc aac cca att gat gat tcc aac ccg gcg gat aac gtg gcg att 144
Asp Ile Asn Pro Ile Asp Asp Ser Asn Pro Ala Asp Asn Val Ala Ile
35 40 45

atc gaa tcg gaa ttg ttc caa tac agc gag tcc ttg gcg gaa aaa ccg 192
Ile Glu Ser Glu Leu Phe Gln Tyr Ser Glu Ser Leu Ala Glu Lys Pro
50 55 60

cgc tgg ctg gtg ttc aac aaa atc gat acg ctc agt gat gaa gaa gcc 240
Arg Trp Leu Val Phe Asn Lys Ile Asp Thr Leu Ser Asp Glu Glu Ala
65 70 75 80

cat gcg cga gcg aaa gag atc acc gaa cgt ctg ggc cgg gag gaa ggt 288
His Ala Arg Ala Lys Glu Ile Thr Glu Arg Leu Gly Arg Glu Glu Gly
85 90 95

tat tat tta att tcc gcc gcc acc ggt aaa aac gcc ccg caa ctg tgc 336
Tyr Tyr Leu Ile Ser Ala Ala Thr Gly Lys Asn Ala Pro Gln Leu Cys
100 105 110

cgc gat att atg gac ttc ctg gaa gcc cac ccg cgc aaa aca gaa aaa 384
 Arg Asp Ile Met Asp Phe Leu Glu Ala His Pro Arg Lys Thr Glu Lys
 115 120 125

acg ccg gta gaa aat gaa gaa gtc aaa ttc aaa tgg gaa gat tat cat 432
 Thr Pro Val Glu Asn Glu Glu Val Lys Phe Lys Trp Glu Asp Tyr His
 130 135 140

cag gag caa ttg gaa aat gcc gat gtt gat gat gaa gag gat aat gac 480
 Gln Glu Gln Leu Glu Asn Ala Asp Val Asp Asp Glu Glu Asp Asn Asp
 145 150 155 160

tgg gat gac tgg tcg gaa gac gat gaa gaa ggc gtg gaa att atc tat 528
 Trp Asp Asp Trp Ser Glu Asp Asp Glu Glu Gly Val Glu Ile Ile Tyr
 165 170 175

aag cct 534
 Lys Pro

<210> 82
 <211> 178
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 82

Ile Pro Gly Leu Ile Glu Gly Ala Ser Glu Gly Ala Gly Leu Gly Ile
 1 5 10 15

Arg Phe Leu Lys His Leu Glu Arg Cys Arg Val Leu Ile His Leu Val
 20 25 30

Asp Ile Asn Pro Ile Asp Asp Ser Asn Pro Ala Asp Asn Val Ala Ile
 35 40 45

Ile Glu Ser Glu Leu Phe Gln Tyr Ser Glu Ser Leu Ala Glu Lys Pro
 50 55 60

Arg Trp Leu Val Phe Asn Lys Ile Asp Thr Leu Ser Asp Glu Glu Ala
 65 70 75 80

His Ala Arg Ala Lys Glu Ile Thr Glu Arg Leu Gly Arg Glu Glu Gly
 85 90 95

Tyr Tyr Leu Ile Ser Ala Ala Thr Gly Lys Asn Ala Pro Gln Leu Cys
 100 105 110

Arg Asp Ile Met Asp Phe Leu Glu Ala His Pro Arg Lys Thr Glu Lys
 115 120 125

Thr Pro Val Glu Asn Glu Glu Val Lys Phe Lys Trp Glu Asp Tyr His
 130 135 140

Gln Glu Gln Leu Glu Asn Ala Asp Val Asp Asp Glu Glu Asp Asn Asp
 145 150 155 160

Trp Asp Asp Trp Ser Glu Asp Asp Glu Glu Gly Val Glu Ile Ile Tyr
 165 170 175

Lys Pro

<210> 83
 <211> 372
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1)..(372)

<400> 83
 atg tta acg gaa agt gcg gtc gtt att gag tac gaa tcc ggc aga gcc 48
 Met Leu Thr Glu Ser Ala Val Val Ile Glu Tyr Glu Ser Gly Arg Ala
 1 5 10 15
 aaa gtg aaa tgc caa tca caa agc gca tgc ggc gct tgc gcg gca aaa 96
 Lys Val Lys Cys Gln Ser Gln Ser Ala Cys Gly Ala Cys Ala Ala Lys
 20 25 30
 ccg gcg tgc ggt aat tct gcc ttg tcg gaa tta gcc agc agc ggc gcg 144
 Pro Ala Cys Gly Asn Ser Ala Leu Ser Glu Leu Ala Ser Ser Gly Ala
 35 40 45
 cgc ggc gaa cat att ttc acc atc gag acc att acg cca ctg aaa atc 192
 Arg Gly Glu His Ile Phe Thr Ile Glu Thr Ile Thr Pro Leu Lys Ile
 50 55 60
 ggg caa cgg gtg gaa atc ggt ttg tcc gaa cgt tcc tta atc aaa tcc 240
 Gly Gln Arg Val Glu Ile Gly Leu Ser Glu Arg Ser Leu Ile Lys Ser
 65 70 75 80
 gcc ttg ctc atg tat tgc gtg ccg cta ttt act tta tta ttc agc acg 288
 Ala Leu Leu Met Tyr Cys Val Pro Leu Phe Thr Leu Leu Phe Ser Thr
 85 90 95
 tta tta ttt gat tcg ctg ttt gcc cat gag ctc gtc agc gtc ttt ttt 336
 Leu Leu Phe Asp Ser Leu Phe Ala His Glu Leu Val Ser Val Phe Phe
 100 105 110

atc ttc att tcc act gca ctt tct ttc ctt ggt gtg
 Ile Phe Ile Ser Thr Ala Leu Ser Phe Leu Gly Val
 115 120

372

<210> 84
 <211> 124
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 84

Met Leu Thr Glu Ser Ala Val Val Ile Glu Tyr Glu Ser Gly Arg Ala
 1 5 10 15

Lys Val Lys Cys Gln Ser Gln Ser Ala Cys Gly Ala Cys Ala Ala Lys
 20 25 30

Pro Ala Cys Gly Asn Ser Ala Leu Ser Glu Leu Ala Ser Ser Gly Ala
 35 40 45

Arg Gly Glu His Ile Phe Thr Ile Glu Thr Ile Thr Pro Leu Lys Ile
 50 55 60

Gly Gln Arg Val Glu Ile Gly Leu Ser Glu Arg Ser Leu Ile Lys Ser
 65 70 75 80

Ala Leu Leu Met Tyr Cys Val Pro Leu Phe Thr Leu Leu Phe Ser Thr
 85 90 95

Leu Leu Phe Asp Ser Leu Phe Ala His Glu Leu Val Ser Val Phe Phe
 100 105 110

Ile Phe Ile Ser Thr Ala Leu Ser Phe Leu Gly Val
 115 120

<210> 85
 <211> 629
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1)..(627)

<400> 85

att tct tcc ggt tcc tta ttg ctt gcc gtg ctt tat aaa cgc aat cgc
 Ile Ser Ser Gly Ser Leu Leu Leu Ala Val Leu Tyr Lys Arg Asn Arg

48

| 1 | 5 | 10 | 15 | |
|---|---|-----|-----|-----|
| aaa ccg gaa aaa aca agc gaa aac tgg att att cgc agt gct gcg atc | | | | 96 |
| Lys Pro Glu Lys Thr Ser Glu Asn Trp Ile Ile Arg Ser Ala Ala Ile | | | | |
| 20 | | 25 | 30 | |
| tta gcg cct ggc acg gtg att atc ggt tta ttg ctg ttg att ttc cac | | | | 144 |
| Leu Ala Pro Gly Thr Val Ile Ile Gly Leu Leu Leu Leu Ile Phe His | | | | |
| 35 | | 40 | 45 | |
| ttg gcg cgc cct tgg acg ttc tgg tat ttg atg ttt aac tac cag ttc | | | | 192 |
| Leu Ala Arg Pro Trp Thr Phe Trp Tyr Leu Met Phe Asn Tyr Gln Phe | | | | |
| 50 | | 55 | 60 | |
| aat tcc gtg atg tcc atg ggg gta ctg tta ttc caa atc tat atg gcg | | | | 240 |
| Asn Ser Val Met Ser Met Gly Val Leu Leu Phe Gln Ile Tyr Met Ala | | | | |
| 65 | | 70 | 75 | 80 |
| gcg gtt ctc ctc tgg att gcg att ctc ttt aaa aat gaa ctt gcc gcc | | | | 288 |
| Ala Val Leu Leu Trp Ile Ala Ile Leu Phe Lys Asn Glu Leu Ala Ala | | | | |
| 85 | | 90 | 95 | |
| ttg ctc gat aga ttt tta ccg aaa tta aaa ttt atc gtg aaa tgg att | | | | 336 |
| Leu Leu Asp Arg Phe Leu Pro Lys Leu Lys Phe Ile Val Lys Trp Ile | | | | |
| 100 | | 105 | 110 | |
| ttc gcc tgt gaa cgc att acc aac ccg ttg gaa ctg ttc ctg ttg ttc | | | | 384 |
| Phe Ala Cys Glu Arg Ile Thr Asn Pro Leu Glu Leu Phe Leu Leu Phe | | | | |
| 115 | | 120 | 125 | |
| ctt gcg gtg ttg cta ggc gct tat acc ggt ttc tta ttg tcg gcg tta | | | | 432 |
| Leu Ala Val Leu Leu Gly Ala Tyr Thr Gly Phe Leu Leu Ser Ala Leu | | | | |
| 130 | | 135 | 140 | |
| atc agc tac ccg atg cta aac aat ccc gta ttg ccg gca tta ttc ctc | | | | 480 |
| Ile Ser Tyr Pro Met Leu Asn Asn Pro Val Leu Pro Ala Leu Phe Leu | | | | |
| 145 | | 150 | 155 | 160 |
| gct tcg ggc acg tct tcc ggt atc gcg gcg gta ttc tta acc atc ctg | | | | 528 |
| Ala Ser Gly Thr Ser Ser Gly Ile Ala Ala Val Phe Leu Thr Ile Leu | | | | |
| 165 | | 170 | 175 | |
| att gtg ggc aaa tta aaa ggg cat tcc gac gaa gtg aat ttc atg cat | | | | 576 |
| Ile Val Gly Lys Leu Lys Gly His Ser Asp Glu Val Asn Phe Met His | | | | |
| 180 | | 185 | 190 | |
| aaa ttt gaa gtg ccg atc atg ctc gcc gaa ctc ttt tgc atc ggc tgc | | | | 624 |
| Lys Phe Glu Val Pro Ile Met Leu Ala Glu Leu Phe Cys Ile Gly Cys | | | | |
| 195 | | 200 | 205 | |
| ttc tt | | | | 629 |
| Phe | | | | |

<210> 86
<211> 209

<212> PRT

<213> Actinobacillus actinomycetemcomitans

<400> 86

Ile Ser Ser Gly Ser Leu Leu Leu Ala Val Leu Tyr Lys Arg Asn Arg
1 5 10 15

Lys Pro Glu Lys Thr Ser Glu Asn Trp Ile Ile Arg Ser Ala Ala Ile
20 25 30

Leu Ala Pro Gly Thr Val Ile Ile Gly Leu Leu Leu Leu Ile Phe His
35 40 45

Leu Ala Arg Pro Trp Thr Phe Trp Tyr Leu Met Phe Asn Tyr Gln Phe
50 55 60

Asn Ser Val Met Ser Met Gly Val Leu Leu Phe Gln Ile Tyr Met Ala
65 70 75 80

Ala Val Leu Leu Trp Ile Ala Ile Leu Phe Lys Asn Glu Leu Ala Ala
85 90 95

Leu Leu Asp Arg Phe Leu Pro Lys Leu Lys Phe Ile Val Lys Trp Ile
100 105 110

Phe Ala Cys Glu Arg Ile Thr Asn Pro Leu Glu Leu Phe Leu Leu Phe
115 120 125

Leu Ala Val Leu Leu Gly Ala Tyr Thr Gly Phe Leu Leu Ser Ala Leu
130 135 140

Ile Ser Tyr Pro Met Leu Asn Asn Pro Val Leu Pro Ala Leu Phe Leu
145 150 155 160

Ala Ser Gly Thr Ser Ser Gly Ile Ala Ala Val Phe Leu Thr Ile Leu
165 170 175

Ile Val Gly Lys Leu Lys Gly His Ser Asp Glu Val Asn Phe Met His
180 185 190

Lys Phe Glu Val Pro Ile Met Leu Ala Glu Leu Phe Cys Ile Gly Cys
195 200 205

Phe

<210> 87
<211> 266
<212> DNA
<213> Actinobacillus actinomycetemcomitans

<220>
<221> CDS
<222> (1)..(264)

<400> 87
tgg gat gcc att gag aaa tgt att cag gaa tgg caa ccg gcg cgt att 48
Trp Asp Ala Ile Glu Lys Cys Ile Gln Glu Trp Gln Pro Ala Arg Ile
1 5 10 15
gtg gtc ggt ttg cca ctg aat atg gat ggt acg gaa cag ccc tta acg 96
Val Val Gly Leu Pro Leu Asn Met Asp Gly Thr Glu Gln Pro Leu Thr
20 25 30
ttg cgt gcc aaa aag ttt gct aag cgt ttg cac gga cgt ttt aac gtg 144
Leu Arg Ala Lys Lys Phe Ala Lys Arg Leu His Gly Arg Phe Asn Val
35 40 45
ccg gtg gat tta cag gac gaa cgt ctt acc acc acc gaa gcg cgt agc 192
Pro Val Asp Leu Gln Asp Glu Arg Leu Thr Thr Thr Glu Ala Arg Ser
50 55 60
gaa att ttc agt cgt ggt ggt tat cgc gcc tta aat aaa agc aaa gtg 240
Glu Ile Phe Ser Arg Gly Gly Tyr Arg Ala Leu Asn Lys Ser Lys Val
65 70 75 80
gac ggc att tcc gcc tgt ttg att tt 266
Asp Gly Ile Ser Ala Cys Leu Ile
85

<210> 88
<211> 88
<212> PRT
<213> Actinobacillus actinomycetemcomitans

<400> 88
Trp Asp Ala Ile Glu Lys Cys Ile Gln Glu Trp Gln Pro Ala Arg Ile
1 5 10 15
Val Val Gly Leu Pro Leu Asn Met Asp Gly Thr Glu Gln Pro Leu Thr
20 25 30
Leu Arg Ala Lys Lys Phe Ala Lys Arg Leu His Gly Arg Phe Asn Val
35 40 45

Pro Val Asp Leu Gln Asp Glu Arg Leu Thr Thr Thr Glu Ala Arg Ser
50 55 60

Glu Ile Phe Ser Arg Gly Gly Tyr Arg Ala Leu Asn Lys Ser Lys Val
65 70 75 80

Asp Gly Ile Ser Ala Cys Leu Ile
85

<210> 89
<211> 567
<212> DNA
<213> Actinobacillus actinomycetemcomitans

<220>
<221> CDS
<222> (1)..(567)

<400> 89
caa caa gta aaa gcg ccg gga gaa gcc aaa tcc gac gta tgg caa ttg 48
Gln Gln Val Lys Ala Pro Gly Glu Ala Lys Ser Asp Val Trp Gln Leu
1 5 10 15

gta gaa ttc tcc aaa tat ttc acc acc gat gaa atg tgg ccg gcg gaa 96
Val Glu Phe Ser Lys Tyr Phe Thr Thr Asp Glu Met Trp Pro Ala Glu
20 25 30

att ctg gac aaa aat ccg gaa tac aaa ggc aaa acc tta tat gac gtg 144
Ile Leu Asp Lys Asn Pro Glu Tyr Lys Gly Lys Thr Leu Tyr Asp Val
35 40 45

tta tac cgc aac ggt caa gta gat aaa ttc ccg tta agc gaa ttg gcg 192
Leu Tyr Arg Asn Gly Gln Val Asp Lys Phe Pro Leu Ser Glu Leu Ala
50 55 60

gaa gga caa ttg aat gat gag tcc tat cac ttc ggt ttc tac ttg caa 240
Glu Gly Gln Leu Asn Asp Glu Ser Tyr His Phe Gly Phe Tyr Leu Gln
65 70 75 80

aaa ggc tta ttt gag gaa tac gcc tcc ttc ggt cgc ggt cac gga cat 288
Lys Gly Leu Phe Glu Glu Tyr Ala Ser Phe Gly Arg Gly His Gly His
85 90 95

gac ttg gca tcg ttc gat act tac cac aaa gca cgc ggt tta cgc tgg 336
Asp Leu Ala Ser Phe Asp Thr Tyr His Lys Ala Arg Gly Leu Arg Trp
100 105 110

ccg gtg gtg gac ggc aaa gaa acc tta tgg cgt tat cgc gaa ggc tac 384
Pro Val Val Asp Gly Lys Glu Thr Leu Trp Arg Tyr Arg Glu Gly Tyr
115 120 125

gac ccg tat gtc aaa gaa ggg gaa ggt gtg gcg ttc tac ggc tat ccg 432
Asp Pro Tyr Val Lys Glu Gly Glu Gly Val Ala Phe Tyr Gly Tyr Pro

| 130 | 135 | 140 | |
|---|-----|-----|-----|
| gat aaa aaa gcg att att ctt gcc gtg cct tat gag ccg cct gcg gaa | | | 480 |
| Asp Lys Lys Ala Ile Ile Leu Ala Val Pro Tyr Glu Pro Pro Ala Glu | | | |
| 145 | 150 | 155 | 160 |
| tca ccg gac gaa gaa tac gat ttg tgg tta tgt acc ggt cgc gtg ttg | | | 528 |
| Ser Pro Asp Glu Glu Tyr Asp Leu Trp Leu Cys Thr Gly Arg Val Leu | | | |
| | 165 | 170 | 175 |
| gaa cac tgg cac acc ggc acc atg acc cgt cgt gta cca | | | 567 |
| Glu His Trp His Thr Gly Thr Met Thr Arg Arg Val Pro | | | |
| | 180 | 185 | |

<210> 90
 <211> 189
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 90

| |
|---|
| Gln Gln Val Lys Ala Pro Gly Glu Ala Lys Ser Asp Val Trp Gln Leu |
| 1 5 10 15 |

| |
|---|
| Val Glu Phe Ser Lys Tyr Phe Thr Thr Asp Glu Met Trp Pro Ala Glu |
| 20 25 30 |

| |
|---|
| Ile Leu Asp Lys Asn Pro Glu Tyr Lys Gly Lys Thr Leu Tyr Asp Val |
| 35 40 45 |

| |
|---|
| Leu Tyr Arg Asn Gly Gln Val Asp Lys Phe Pro Leu Ser Glu Leu Ala |
| 50 55 60 |

| |
|---|
| Glu Gly Gln Leu Asn Asp Glu Ser Tyr His Phe Gly Phe Tyr Leu Gln |
| 65 70 75 80 |

| |
|---|
| Lys Gly Leu Phe Glu Glu Tyr Ala Ser Phe Gly Arg Gly His Gly His |
| 85 90 95 |

| |
|---|
| Asp Leu Ala Ser Phe Asp Thr Tyr His Lys Ala Arg Gly Leu Arg Trp |
| 100 105 110 |

| |
|---|
| Pro Val Val Asp Gly Lys Glu Thr Leu Trp Arg Tyr Arg Glu Gly Tyr |
| 115 120 125 |

| |
|---|
| Asp Pro Tyr Val Lys Glu Gly Glu Gly Val Ala Phe Tyr Gly Tyr Pro |
| 130 135 140 |

Asp Lys Lys Ala Ile Ile Leu Ala Val Pro Tyr Glu Pro Pro Ala Glu
145 150 155 160

Ser Pro Asp Glu Glu Tyr Asp Leu Trp Leu Cys Thr Gly Arg Val Leu
165 170 175

Glu His Trp His Thr Gly Thr Met Thr Arg Arg Val Pro
180 185

<210> 91
<211> 563
<212> DNA
<213> Actinobacillus actinomycetemcomitans

<220>
<221> CDS
<222> (1)..(561)

<400> 91
ccg aaa cct ttc tat ttt tcc gct gaa aaa gat ggc att ggt gta gaa 48
Pro Lys Pro Phe Tyr Phe Ser Ala Glu Lys Asp Gly Ile Gly Val Glu
1 5 10 15

att gcg ttg caa tgg aac gac ggt tac gcg gaa aac att tat tgt ttc 96
Ile Ala Leu Gln Trp Asn Asp Gly Tyr Ala Glu Asn Ile Tyr Cys Phe
20 25 30

acc aac aac att ccg caa cgg gac ggc ggt acg cac tta gcc ggt ttc 144
Thr Asn Asn Ile Pro Gln Arg Asp Gly Gly Thr His Leu Ala Gly Phe
35 40 45

cgt ggc gca atg acc cgc acc ttg aac aac tac atg gaa aac gaa ggc 192
Arg Gly Ala Met Thr Arg Thr Leu Asn Asn Tyr Met Glu Asn Glu Gly
50 55 60

tac acc aag aaa tcc aaa gtg gcg act tcc ggt gat gat gcc cgt gaa 240
Tyr Thr Lys Lys Ser Lys Val Ala Thr Ser Gly Asp Asp Ala Arg Glu
65 70 75 80

ggc ttg gtg gcg gtg att tcc gtg aaa gta ccg gat ccg aaa ttc tct 288
Gly Leu Val Ala Val Ile Ser Val Lys Val Pro Asp Pro Lys Phe Ser
85 90 95

tct caa aca aaa gac aaa ctg gtt tcc tcc gaa gtg aaa agt gcg gtg 336
Ser Gln Thr Lys Asp Lys Leu Val Ser Ser Glu Val Lys Ser Ala Val
100 105 110

gaa tcc ctg atg aac gaa tat tta caa acc tat ttg ttg gaa aac ccg 384
Glu Ser Leu Met Asn Glu Tyr Leu Gln Thr Tyr Leu Leu Glu Asn Pro
115 120 125

aac gat gta aaa atc atc gtg acc aaa att att gat gcc gcg cgt gcc 432
Asn Asp Val Lys Ile Ile Val Thr Lys Ile Ile Asp Ala Ala Arg Ala

| | | | |
|---|-----|-----|-----|
| 130 | 135 | 140 | |
| cgt gaa gcc gcc cgc aaa gcc cgc gaa atg acc cgt cgt aaa ggc gcg | | | 480 |
| Arg Glu Ala Ala Arg Lys Ala Arg Glu Met Thr Arg Arg Lys Gly Ala | | | |
| 145 | 150 | 155 | 160 |
| ttg gat tta ggc ggc ttg ccg ggc aaa ttg gcg gat tgt cag gaa cgc | | | 528 |
| Leu Asp Leu Gly Gly Leu Pro Gly Lys Leu Ala Asp Cys Gln Glu Arg | | | |
| | 165 | 170 | 175 |
| gat ccg gcg tta tcc gag ctt tac atc gtg gag gg | | | 563 |
| Asp Pro Ala Leu Ser Glu Leu Tyr Ile Val Glu | | | |
| | 180 | 185 | |

<210> 92
 <211> 187
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 92

| |
|---|
| Pro Lys Pro Phe Tyr Phe Ser Ala Glu Lys Asp Gly Ile Gly Val Glu |
| 1 5 10 15 |

| |
|---|
| Ile Ala Leu Gln Trp Asn Asp Gly Tyr Ala Glu Asn Ile Tyr Cys Phe |
| 20 25 30 |

| |
|---|
| Thr Asn Asn Ile Pro Gln Arg Asp Gly Gly Thr His Leu Ala Gly Phe |
| 35 40 45 |

| |
|---|
| Arg Gly Ala Met Thr Arg Thr Leu Asn Asn Tyr Met Glu Asn Glu Gly |
| 50 55 60 |

| |
|---|
| Tyr Thr Lys Lys Ser Lys Val Ala Thr Ser Gly Asp Asp Ala Arg Glu |
| 65 70 75 80 |

| |
|---|
| Gly Leu Val Ala Val Ile Ser Val Lys Val Pro Asp Pro Lys Phe Ser |
| 85 90 95 |

| |
|---|
| Ser Gln Thr Lys Asp Lys Leu Val Ser Ser Glu Val Lys Ser Ala Val |
| 100 105 110 |

| |
|---|
| Glu Ser Leu Met Asn Glu Tyr Leu Gln Thr Tyr Leu Leu Glu Asn Pro |
| 115 120 125 |

| |
|---|
| Asn Asp Val Lys Ile Ile Val Thr Lys Ile Ile Asp Ala Ala Arg Ala |
| 130 135 140 |

Arg Glu Ala Ala Arg Lys Ala Arg Glu Met Thr Arg Arg Lys Gly Ala
145 150 155 160

Leu Asp Leu Gly Gly Leu Pro Gly Lys Leu Ala Asp Cys Gln Glu Arg
165 170 175

Asp Pro Ala Leu Ser Glu Leu Tyr Ile Val Glu
180 185

<210> 93
<211> 627
<212> DNA
<213> Actinobacillus actinomycetemcomitans

<220>
<221> CDS
<222> (1)..(627)

<400> 93
aaa cag caa tta gcc gct gca ctt gcc cga caa gaa caa aaa caa att 48
Lys Gln Gln Leu Ala Ala Ala Leu Ala Arg Gln Glu Gln Lys Gln Ile
1 5 10 15

atc gtt tta caa aaa aag tta acg tct ttg tct tcc cta tcc cca caa 96
Ile Val Leu Gln Lys Lys Leu Thr Ser Leu Ser Ser Leu Ser Pro Gln
20 25 30

cgt ctt gcg caa caa att cgg act acc gaa aaa att ctg acc cgt att 144
Arg Leu Ala Gln Gln Ile Arg Thr Thr Glu Lys Ile Leu Thr Arg Ile
35 40 45

ttt aaa aca gag aaa aat ctg aca ccc aaa ttt att gat tac ctg tat 192
Phe Lys Thr Glu Lys Asn Leu Thr Pro Lys Phe Ile Asp Tyr Leu Tyr
50 55 60

ttt gag cca att gaa acg gct gat gac acc tta atg cag gaa atg aaa 240
Phe Glu Pro Ile Glu Thr Ala Asp Asp Thr Leu Met Gln Glu Met Lys
65 70 75 80

aaa aat ctt ttg atc tct ttc ttg gca aat gaa cgc gct caa atc tat 288
Lys Asn Leu Leu Ile Ser Phe Leu Ala Asn Glu Arg Ala Gln Ile Tyr
85 90 95

att aaa gac atg cca aac gct aat caa ttt gtt cag ctt tta aca gaa 336
Ile Lys Asp Met Pro Asn Ala Asn Gln Phe Val Gln Leu Leu Thr Glu
100 105 110

aaa gga gca aag act acg caa ata tcc gta ttg gca gaa cct gct aaa 384
Lys Gly Ala Lys Thr Thr Gln Ile Ser Val Leu Ala Glu Pro Ala Lys
115 120 125

acc att ttc cag cga atc cgc gaa caa atg tac caa gat ttt cct aat 432
Thr Ile Phe Gln Arg Ile Arg Glu Gln Met Tyr Gln Asp Phe Pro Asn

aaa aaa cag ttt act atc act gaa aat cga gta agt gtt att gcc cct 480
 Lys Lys Gln Phe Thr Ile Thr Glu Asn Arg Val Ser Val Ile Ala Pro
 145 150 155 160

tcc tcc gtt att aag cca cgc ctt gcc ttg gca gct gca att ttt gat 528
 Ser Ser Val Ile Lys Pro Arg Leu Ala Leu Ala Ala Ala Ile Phe Asp
 165 170 175

cag cag ttt aaa ggg gtt gaa gtt gat gat ttt tct tac ttg gat caa 576
 Gln Gln Phe Lys Gly Val Glu Val Asp Asp Phe Ser Tyr Leu Asp Gln
 180 185 190

ccg cgt gaa aat ttg caa cac aat aat gat aca acc cgt tat aaa acc 624
 Pro Arg Glu Asn Leu Gln His Asn Asn Asp Thr Thr Arg Tyr Lys Thr
 195 200 205

ttt 627
 Phe

<210> 94
 <211> 209
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans
 <400> 94

Lys Gln Gln Leu Ala Ala Ala Leu Ala Arg Gln Glu Gln Lys Gln Ile
 1 5 10 15

Ile Val Leu Gln Lys Lys Leu Thr Ser Leu Ser Ser Leu Ser Pro Gln
 20 25 30

Arg Leu Ala Gln Gln Ile Arg Thr Thr Glu Lys Ile Leu Thr Arg Ile
 35 40 45

Phe Lys Thr Glu Lys Asn Leu Thr Pro Lys Phe Ile Asp Tyr Leu Tyr
 50 55 60

Phe Glu Pro Ile Glu Thr Ala Asp Asp Thr Leu Met Gln Glu Met Lys
 65 70 75 80

Lys Asn Leu Leu Ile Ser Phe Leu Ala Asn Glu Arg Ala Gln Ile Tyr
 85 90 95

Ile Lys Asp Met Pro Asn Ala Asn Gln Phe Val Gln Leu Leu Thr Glu
 100 105 110

Lys Gly Ala Lys Thr Thr Gln Ile Ser Val Leu Ala Glu Pro Ala Lys
 115 120 125

Thr Ile Phe Gln Arg Ile Arg Glu Gln Met Tyr Gln Asp Phe Pro Asn
 130 135 140

Lys Lys Gln Phe Thr Ile Thr Glu Asn Arg Val Ser Val Ile Ala Pro
 145 150 155 160

Ser Ser Val Ile Lys Pro Arg Leu Ala Leu Ala Ala Ala Ile Phe Asp
 165 170 175

Gln Gln Phe Lys Gly Val Glu Val Asp Asp Phe Ser Tyr Leu Asp Gln
 180 185 190

Pro Arg Glu Asn Leu Gln His Asn Asn Asp Thr Thr Arg Tyr Lys Thr
 195 200 205

Phe

<210> 95
 <211> 270
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1) .. (270)

<400> 95
 tct gac aat acg caa tat ttt tgc ccg gcg gga tta agc gag gag cgt 48
 Ser Asp Asn Thr Gln Tyr Phe Cys Pro Ala Gly Leu Ser Glu Glu Arg
 1 5 10 15

gaa cag gag ctc cgc cgt ttg gta aaa cag gcc tat gat gtg gtg ggc 96
 Glu Gln Glu Leu Arg Arg Leu Val Lys Gln Ala Tyr Asp Val Val Gly
 20 25 30

tgt cgt ggt tgg agc cgt att gat gtg atg gcg gat gcg gaa gga aag 144
 Cys Arg Gly Trp Ser Arg Ile Asp Val Met Ala Asp Ala Glu Gly Lys
 35 40 45

ttc cgt ttg gtg gaa gtt aat acc aac cct ggc atg acc agc cac agt 192
 Phe Arg Leu Val Glu Val Asn Thr Asn Pro Gly Met Thr Ser His Ser
 50 55 60

tta ttc ccg aaa tcg gcg gca acg gtc ggc tat tct ttt gcg cag ttg 240
 Leu Phe Pro Lys Ser Ala Ala Thr Val Gly Tyr Ser Phe Ala Gln Leu

80

270

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<210> 96
<211> 90
<212> PRT
<213> Actinobacillus actinomycetemcomitans
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<400> 96

Ser Asp Asn Thr Gln Tyr Phe Cys Pro Ala Gly Leu Ser Glu Glu Arg
1 5 10 15

Glu Gln Glu Leu Arg Arg Leu Val Lys Gln Ala Tyr Asp Val Val Gly
20 25 30

Cys Arg Gly Trp Ser Arg Ile Asp Val Met Ala Asp Ala Glu Gly Lys
35 40 45

Phe Arg Leu Val Glu Val Asn Thr Asn Pro Gly Met Thr Ser His Ser
50 55 60

Leu Phe Pro Lys Ser Ala Ala Thr Val Gly Tyr Ser Phe Ala Gln Leu
65 70 75 80

Val Glu Lys Ile Leu Glu Leu Ser Ala Glu
85 90

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<210> 97
<211> 379
<212> DNA
<213> Actinobacillus actinomycetemcomitans
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<220>  
<221> CDS  
<222> (1) .. (378)
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<400> 97
 ggg gaa tat ttc ggt cct tat ccg aat gcc ggt gca gtg cgc gaa acc 48
 Gly Glu Tyr Phe Gly Pro Tyr Pro Asn Ala Gly Ala Val Arg Glu Thr
 1 5 10 15

ctg tct tta tta caa aaa ctg ttc ccc att cgg cag tgt gaa aac tcc 96
Leu Ser Leu Leu Gln Lys Leu Phe Pro Ile Arg Gln Cys Glu Asn Ser
20 25 30

gtg tat aac aac cgt tcg cgc ccc tgt ttg cag tat caa atc ggg cgt 144

Val Tyr Asn Asn Arg Ser Arg Pro Cys Leu Gln Tyr Gln Ile Gly Arg
35 40 45

tgt ctg gcg cct tgc gta aag ggc tat gtg acc gat gaa gcc tat gcg 192
Cys Leu Ala Pro Cys Val Lys Gly Tyr Val Thr Asp Glu Ala Tyr Ala
50 55 60

cag cag gtc aat ttc gcc cgc ttg ttt tta caa gga aaa gat caa cag 240
Gln Gln Val Asn Phe Ala Arg Leu Phe Leu Gln Gly Lys Asp Gln Gln
65 70 75 80

gtg ctg gat cat ttg gtg aag caa atg gaa cag gca agt cag caa ctg 288
Val Leu Asp His Leu Val Lys Gln Met Glu Gln Ala Ser Gln Gln Leu
85 90 95

aat ttt gaa gaa gcg gca cgc gtt cgt gat caa att cag gca gtg cgg 336
Asn Phe Glu Glu Ala Ala Arg Val Arg Asp Gln Ile Gln Ala Val Arg
100 105 110

gca gta att gaa aaa caa ttt gtc gcc aac gat cgc cat gac g 379
Ala Val Ile Glu Lys Gln Phe Val Ala Asn Asp Arg His Asp
115 120 125

<210> 98
<211> 126
<212> PRT
<213> Actinobacillus actinomycescomitans

<400> 98

Gly Glu Tyr Phe Gly Pro Tyr Pro Asn Ala Gly Ala Val Arg Glu Thr
1 5 10 15

Leu Ser Leu Leu Gln Lys Leu Phe Pro Ile Arg Gln Cys Glu Asn Ser
20 25 30

Val Tyr Asn Asn Arg Ser Arg Pro Cys Leu Gln Tyr Gln Ile Gly Arg
35 40 45

Cys Leu Ala Pro Cys Val Lys Gly Tyr Val Thr Asp Glu Ala Tyr Ala
50 55 60

Gln Gln Val Asn Phe Ala Arg Leu Phe Leu Gln Gly Lys Asp Gln Gln
65 70 75 80

Val Leu Asp His Leu Val Lys Gln Met Glu Gln Ala Ser Gln Gln Leu
85 90 95

Asn Phe Glu Glu Ala Ala Arg Val Arg Asp Gln Ile Gln Ala Val Arg
100 105 110

Ala Val Ile Glu Lys Gln Phe Val Ala Asn Asp Arg His Asp
 115 120 125

<210> 99
 <211> 625
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1) .. (624)

<400> 99
 gca aaa acc tta gat ttt cag tcc gca ggg ccg gaa aaa ctc ccg aaa 48
 Ala Lys Thr Leu Asp Phe Gln Ser Ala Gly Pro Glu Lys Leu Pro Lys
 1 5 10 15
 ttt caa ccg cac ttt ttg gcg caa agc caa caa tta atc gac att tgc 96
 Phe Gln Pro His Phe Leu Ala Gln Ser Gln Gln Leu Ile Asp Ile Cys
 20 25 30
 cgc cgc ctg aca ccg gcg gat att gct tcg ctc atg tct atc agc gac 144
 Arg Arg Leu Thr Pro Ala Asp Ile Ala Ser Leu Met Ser Ile Ser Asp
 35 40 45
 aaa ctt gcc ggg ttg aat gcc gca cgt ttc gcc gaa tgg cag ttg gaa 192
 Lys Leu Ala Gly Leu Asn Ala Ala Arg Phe Ala Glu Trp Gln Leu Glu
 50 55 60
 cat aac gaa cac aat gcc aaa gcg gcg gtg tat gcc ttt aga ggc gat 240
 His Asn Glu His Asn Ala Lys Ala Ala Val Tyr Ala Phe Arg Gly Asp
 65 70 75 80
 gtt tac acc ggc ttg gac gtg gat tcc tta agc aat gac gat atg ttg 288
 Val Tyr Thr Gly Leu Asp Val Asp Ser Leu Ser Asn Asp Asp Met Leu
 85 90 95
 ttt gca caa cag cat ttg cgc att ttg tcc ggg tta tat ggg ctg tta 336
 Phe Ala Gln Gln His Leu Arg Ile Leu Ser Gly Leu Tyr Gly Leu Leu
 100 105 110
 acg ccg ctg gat ttg att cag cct tat cgt ttg gaa atg ggc acc aaa 384
 Thr Pro Leu Asp Leu Ile Gln Pro Tyr Arg Leu Glu Met Gly Thr Lys
 115 120 125
 tta gcc aac ggc aaa ggc gcc gat ttg tat gcc ttt tgg cat ggt ttg 432
 Leu Ala Asn Gly Lys Gly Ala Asp Leu Tyr Ala Phe Trp His Gly Leu
 130 135 140
 gtg atg cag gcg tta caa cag gcg att gat gaa caa cag gac gat gtt 480
 Val Met Gln Ala Leu Gln Gln Ala Ile Asp Glu Gln Gln Asp Asp Val
 145 150 155 160
 ttg gtg aat ctg gcg tcc gat gaa tat tat aaa tcg gta caa ccg tcg 528

Leu Val Asn Leu Ala Ser Asp Glu Tyr Tyr Lys Ser Val Gln Pro Ser
 165 170 175

aat tta acg gcg caa atc att aaa ccg gtg ttc ctg gat aat aaa aac 576
 Asn Leu Thr Ala Gln Ile Ile Lys Pro Val Phe Leu Asp Asn Lys Asn
 180 185 190

ggc aaa tat aaa att atc agt ttc tac gcg aaa aaa gcc cgc ggt tta a 625
 Gly Lys Tyr Lys Ile Ile Ser Phe Tyr Ala Lys Lys Ala Arg Gly Leu
 195 200 205

<210> 100
 <211> 208
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 100

Ala Lys Thr Leu Asp Phe Gln Ser Ala Gly Pro Glu Lys Leu Pro Lys
 1 5 10 15

Phe Gln Pro His Phe Leu Ala Gln Ser Gln Gln Leu Ile Asp Ile Cys
 20 25 30

Arg Arg Leu Thr Pro Ala Asp Ile Ala Ser Leu Met Ser Ile Ser Asp
 35 40 45

Lys Leu Ala Gly Leu Asn Ala Ala Arg Phe Ala Glu Trp Gln Leu Glu
 50 55 60

His Asn Glu His Asn Ala Lys Ala Ala Val Tyr Ala Phe Arg Gly Asp
 65 70 75 80

Val Tyr Thr Gly Leu Asp Val Asp Ser Leu Ser Asn Asp Asp Met Leu
 85 90 95

Phe Ala Gln Gln His Leu Arg Ile Leu Ser Gly Leu Tyr Gly Leu Leu
 100 105 110

Thr Pro Leu Asp Leu Ile Gln Pro Tyr Arg Leu Glu Met Gly Thr Lys
 115 120 125

Leu Ala Asn Gly Lys Gly Ala Asp Leu Tyr Ala Phe Trp His Gly Leu
 130 135 140

Val Met Gln Ala Leu Gln Gln Ala Ile Asp Glu Gln Gln Asp Asp Val
 145 150 155 160

Leu Val Asn Leu Ala Ser Asp Glu Tyr Tyr Lys Ser Val Gln Pro Ser
 165 170 175

Asn Leu Thr Ala Gln Ile Ile Lys Pro Val Phe Leu Asp Asn Lys Asn
 180 185 190

Gly Lys Tyr Lys Ile Ile Ser Phe Tyr Ala Lys Lys Ala Arg Gly Leu
 195 200 205

<210> 101
 <211> 500
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1)..(498)

<400> 101
 cac tgc ttt ata ccg cca tcg cta tgg ctt gct tac cgg cgt atg ccg 48
 His Cys Phe Ile Pro Pro Ser Leu Trp Leu Ala Tyr Arg Arg Met Pro
 1 5 10 15

aag aag ttt tta ccc ttg ggc aaa ttg agg tga ttg ccg ata gat caa 96
 Lys Lys Phe Leu Pro Leu Gly Lys Leu Arg Leu Pro Ile Asp Gln
 20 25 30

cgg att taa gca cca cac gca ttg aac agg ctg act tac aga aaa aca 144
 Arg Ile Ala Pro His Ala Leu Asn Arg Leu Thr Tyr Arg Lys Thr
 35 40 45

atc aaa cca atg tcg ccg agg tgg cga aaa cca cac cgg gcg tat ttt 192
 Ile Lys Pro Met Ser Pro Arg Trp Arg Lys Pro His Arg Ala Tyr Phe
 50 55 60

tgg atc gta gcg gcg cac gca atg aac ata att tgt tgg tac gcg gat 240
 Trp Ile Val Ala Ala His Ala Met Asn Ile Ile Cys Trp Tyr Ala Asp
 65 70 75

tta aag cca atc gcg tgc cag tgt tta ttg acg gca ttc cgg tgt atg 288
 Leu Lys Pro Ile Ala Cys Gln Cys Leu Leu Thr Ala Phe Arg Cys Met
 80 85 90

tgc cct atg acg gca ata tgg aca ttg gtc gct tca cca cct tcg att 336
 Cys Pro Met Thr Ala Ile Trp Thr Leu Val Ala Ser Pro Pro Ser Ile
 95 100 105 110

tat ccc gca ttg ata ttt cca agg gcg caa gtt ccg tgc ttt atg gcg 384
 Tyr Pro Ala Leu Ile Phe Pro Arg Ala Gln Val Pro Cys Phe Met Ala
 115 120 125

cca aca cgc tgg gcg gtg cgg taa atc tca tta cgc aaa aac cga cca 432

Ile Ala Cys Gln Cys Leu Leu Thr Ala Phe Arg Cys Met Cys Pro Met
50 55 60

Thr Ala Ile Trp Thr Leu Val Ala Ser Pro Pro Ser Ile Tyr Pro Ala
65 70 75 80

Leu Ile Phe Pro Arg Ala Gln Val Pro Cys Phe Met Ala Pro Thr Arg
85 90 95

Trp Ala Val Arg
100

<210> 105
<211> 30
<212> PRT
<213> Actinobacillus actinomycetemcomitans

<400> 105

Ile Ser Leu Arg Lys Asn Arg Pro Asn Arg Leu Lys Ala Leu Ser Ala
1 5 10 15

Thr Asp Leu Leu Thr Val Glu Ala Ala Arg Ala Pro Ile
20 25 30

<210> 106
<211> 303
<212> DNA
<213> Actinobacillus actinomycetemcomitans

<220>
<221> CDS
<222> (1)..(303)

<400> 106

gca ttc ttc tcc tta ttt tcc att atc atg agc ggc aga tta aaa gaa 48
Ala Phe Phe Ser Leu Phe Ser Ile Ile Met Ser Gly Arg Leu Lys Glu
1 5 10 15

ttg ggc gaa cac tta aac gaa acc ggc tct ttc aaa gtg ggc atg att 96
Leu Gly Glu His Leu Asn Glu Thr Gly Ser Phe Lys Val Gly Met Ile
20 25 30

tgg aaa gct ttt atc gtc atc acc acc ggt gta ctg gct ttc atg cta 144
Trp Lys Ala Phe Ile Val Ile Thr Thr Gly Val Leu Ala Phe Met Leu
35 40 45

tac aaa gaa gca ggc aaa gtg ctc acc aaa ggc tac gaa ggc tat ccg 192
Tyr Lys Glu Ala Gly Lys Val Leu Thr Lys Gly Tyr Glu Gly Tyr Pro
50 55 60

gac cgg ttc gtc aac acc ttc ggc tgg ggc atg gca atc gct ttg gtg 240
 Asp Arg Phe Val Asn Thr Phe Gly Trp Gly Met Ala Ile Ala Leu Val
 65 70 75 80

atc atc gca ttc ctg ctt tcc cgc ctg ccg tgg aaa cac tta acg caa 288
 Ile Ile Ala Phe Leu Leu Ser Arg Leu Pro Trp Lys His Leu Thr Gln
 85 90 95

aca caa gga gaa aaa 303
 Thr Gln Gly Glu Lys
 100

<210> 107
 <211> 101
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 107

Ala Phe Phe Ser Leu Phe Ser Ile Ile Met Ser Gly Arg Leu Lys Glu
 1 5 10 15

Leu Gly Glu His Leu Asn Glu Thr Gly Ser Phe Lys Val Gly Met Ile
 20 25 30

Trp Lys Ala Phe Ile Val Ile Thr Thr Gly Val Leu Ala Phe Met Leu
 35 40 45

Tyr Lys Glu Ala Gly Lys Val Leu Thr Lys Gly Tyr Glu Gly Tyr Pro
 50 55 60

Asp Arg Phe Val Asn Thr Phe Gly Trp Gly Met Ala Ile Ala Leu Val
 65 70 75 80

Ile Ile Ala Phe Leu Leu Ser Arg Leu Pro Trp Lys His Leu Thr Gln
 85 90 95

Thr Gln Gly Glu Lys
 100

<210> 108
 <211> 465
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1) .. (465)

<400> 108

gtg ttt ata acc gct tgc aac aat ata aac ttc ccg aga tcg gtc tcg 48
Val Phe Ile Thr Ala Cys Asn Asn Ile Asn Phe Pro Arg Ser Val Ser
1 5 10 15

gga ggc ttc agg ttt acg aac ttt gac tac act aaa cag aga acg gat 96
Gly Gly Phe Arg Phe Thr Asn Phe Asp Tyr Thr Lys Gln Arg Thr Asp
20 25 30

ctc ttt taa gta ttc atc aaa acc ttc ccc ctg aaa aac ttt tac tac 144
Leu Phe Val Phe Ile Lys Thr Phe Pro Leu Lys Asn Phe Tyr Tyr
35 40 45

aaa act tcc ttt att agc gag aat ctg ctt gca cat atc aag cgc aag 192
Lys Thr Ser Phe Ile Ser Glu Asn Leu Leu Ala His Ile Lys Arg Lys
50 55 60

ttc tac caa ata cat cgc acg cgg aat atc cac tga tgg cat ccc act 240
Phe Tyr Gln Ile His Arg Thr Arg Asn Ile His Trp His Pro Thr
65 70 75

gaa att cgg tgc cat atc tga cat cac cac atc tac ttt gcc ttc acc 288
Glu Ile Arg Cys His Ile His His His Ile Tyr Phe Ala Phe Thr
80 85 90

gac ccg ctc caa taa aat gtt taa cac att ttc atc acg gaa atc gcc 336
Asp Pro Leu Gln Asn Val His Ile Phe Ile Thr Glu Ile Ala
95 100 105

ttg tag aaa atc cac gcc tac aat agg atc cat ttc cag aag atc aca 384
Leu Lys Ile His Ala Tyr Asn Arg Ile His Phe Gln Lys Ile Thr
110 115 120

ggc aat aat ccg tcc att gcg ccc aat ttg gct tac cac ata ctg cga 432
Gly Asn Asn Pro Ser Ile Ala Pro Asn Leu Ala Tyr His Ile Leu Arg
125 130 135

cca tcc gcc cgg cgc tgc acc taa atc aac cac 465
Pro Ser Ala Arg Arg Cys Thr Ile Asn His
140 145

<210> 109

<211> 34

<212> PRT

<213> Actinobacillus actinomycetemcomitans

<400> 109

Val Phe Ile Thr Ala Cys Asn Asn Ile Asn Phe Pro Arg Ser Val Ser
1 5 10 15

Gly Gly Phe Arg Phe Thr Asn Phe Asp Tyr Thr Lys Gln Arg Thr Asp
20 25 30

Leu Phe

<210> 110
<211> 40
<212> PRT
<213> Actinobacillus actinomycetemcomitans

<400> 110

Val Phe Ile Lys Thr Phe Pro Leu Lys Asn Phe Tyr Tyr Lys Thr Ser
1 5 10 15

Phe Ile Ser Glu Asn Leu Leu Ala His Ile Lys Arg Lys Phe Tyr Gln
20 25 30

Ile His Arg Thr Arg Asn Ile His
35 40

<210> 111
<211> 10
<212> PRT
<213> Actinobacillus actinomycetemcomitans

<400> 111

Trp His Pro Thr Glu Ile Arg Cys His Ile
1 5 10

<210> 112
<211> 13
<212> PRT
<213> Actinobacillus actinomycetemcomitans

<400> 112

His His His Ile Tyr Phe Ala Phe Thr Asp Pro Leu Gln
1 5 10

<210> 113
<211> 9
<212> PRT
<213> Actinobacillus actinomycetemcomitans

<400> 113

His Ile Phe Ile Thr Glu Ile Ala Leu
1 5

<210> 114

<211> 37
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 114

Lys Ile His Ala Tyr Asn Arg Ile His Phe Gln Lys Ile Thr Gly Asn
 1 5 10 15

Asn Pro Ser Ile Ala Pro Asn Leu Ala Tyr His Ile Leu Arg Pro Ser
 20 25 30

Ala Arg Arg Cys Thr
 35

<210> 115
 <211> 630
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1)..(630)

<400> 115

gaa ctg ggc tgg gga ggt tgg tgg ttc tgg gat ccg gtg gaa aat gcg 48
 Glu Leu Gly Trp Gly Gly Trp Trp Phe Trp Asp Pro Val Glu Asn Ala
 1 5 10 15

tcg ctc atg ccg tgg ttg ctc ggc ttg gca ttg ttg cac agt tta atc 96
 Ser Leu Met Pro Trp Leu Leu Gly Leu Ala Leu Leu His Ser Leu Ile
 20 25 30

gtc agc gaa aaa cgc gga att ttt aat tac tgg acg acc tta ttt tcc 144
 Val Ser Glu Lys Arg Gly Ile Phe Asn Tyr Trp Thr Thr Leu Phe Ser
 35 40 45

ttg ttg gca ttt gcc ttc agc gta tta ggc acg ttt atc gtg cgc tcc 192
 Leu Leu Ala Phe Ala Phe Ser Val Leu Gly Thr Phe Ile Val Arg Ser
 50 55 60

ggc gcg ctt acc tcc gta cac gct ttc gct gtg gac agc caa cgc ggc 240
 Gly Ala Leu Thr Ser Val His Ala Phe Ala Val Asp Ser Gln Arg Gly
 65 70 75 80

tcg gca tta tta ctg att ttc ttc ctg ctc acc gtg ggt tct ctc ggt 288
 Ser Ala Leu Leu Leu Ile Phe Phe Leu Leu Thr Val Gly Ser Leu Gly
 85 90 95

tta ttc gcg ttc aaa gcc aat ttg cag caa cgc cgc gtc aaa tta acg 336
 Leu Phe Ala Phe Lys Ala Asn Leu Gln Gln Arg Arg Val Lys Leu Thr
 100 105 110

ctg ctt tcc aaa gaa agt gcg gtg ctt ttt ttg aat gtt tta ttg agt 384

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|-------|--------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| Leu | Leu | Ser | Lys | Glu | Ser | Ala | Val | Leu | Phe | Leu | Asn | Val | Leu | Leu | Ser | | |
| | | 115 | | | | | 120 | | | | | 125 | | | | | |
| atc | gcc | acc | gtt | agc | acc | ttt | ctc | ggc | acc | ttt | tat | ccc | atg | ctg | ttc | 432 | |
| Ile | Ala | Thr | Val | Ser | Thr | Phe | Leu | Gly | Thr | Phe | Tyr | Pro | Met | Leu | Phe | | |
| | 130 | | | | | 135 | | | | 140 | | | | | | | |
| caa | gcc | atg | aat | tgg | ggg | tcc | att | tcc | gtc | ggg | gcg | cct | tat | ttc | aac | 480 | |
| Gln | Ala | Met | Asn | Trp | Gly | Ser | Ile | Ser | Val | Gly | Ala | Pro | Tyr | Phe | Asn | | |
| | 145 | | | | 150 | | | | 155 | | | | | | 160 | | |
| agt | att | ttc | ttg | ccg | ctg | ctt | acg | ctg | att | tta | atc | gcc | atg | gtg | ttt | 528 | |
| Ser | Ile | Phe | Leu | Pro | Leu | Leu | Thr | Leu | Ile | Leu | Ile | Ala | Met | Val | Phe | | |
| | | | 165 | | | | | 170 | | | | | | 175 | | | |
| tcc | ctc | ggc | ttg | cac | tgg | gcg | aag | gcg | gac | aaa | ggc | att | ttg | ttt | aaa | 576 | |
| Ser | Leu | Gly | Leu | His | Trp | Ala | Lys | Ala | Asp | Lys | Gly | Ile | Leu | Phe | Lys | | |
| | | | 180 | | | | 185 | | | | | | 190 | | | | |
| cgc | gcg | gcg | ttg | tta | ctg | ccg | tct | ttg | ttg | atc | gct | tat | ttt | atg | att | 624 | |
| Arg | Ala | Ala | Leu | Leu | Leu | Pro | Ser | Leu | Leu | Ile | Ala | Tyr | Phe | Met | Ile | | |
| | 195 | | | | | 200 | | | | | 205 | | | | | | |
| cgt | cag | | | | | | | | | | | | | | | 630 | |
| Arg | Gln | | | | | | | | | | | | | | | | |
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| <400> | 116 | | | | | | | | | | | | | | | | |
| Glu | Leu | Gly | Trp | Gly | Gly | Trp | Trp | Phe | Trp | Asp | Pro | Val | Glu | Asn | Ala | | |
| 1 | | | | 5 | | | | 10 | | | | | | 15 | | | |
| Ser | Leu | Met | Pro | Trp | Leu | Leu | Gly | Leu | Ala | Leu | Leu | His | Ser | Leu | Ile | | |
| | | 20 | | | | | 25 | | | | | 30 | | | | | |
| Val | Ser | Glu | Lys | Arg | Gly | Ile | Phe | Asn | Tyr | Trp | Thr | Thr | Leu | Phe | Ser | | |
| | 35 | | | | 40 | | | | | | 45 | | | | | | |
| Leu | Leu | Ala | Phe | Ala | Phe | Ser | Val | Leu | Gly | Thr | Phe | Ile | Val | Arg | Ser | | |
| | 50 | | | | 55 | | | | | 60 | | | | | | | |
| Gly | Ala | Leu | Thr | Ser | Val | His | Ala | Phe | Ala | Val | Asp | Ser | Gln | Arg | Gly | | |
| 65 | | | | 70 | | | | | 75 | | | | | 80 | | | |
| Ser | Ala | Leu | Leu | Leu | Ile | Phe | Phe | Leu | Leu | Thr | Val | Gly | Ser | Leu | Gly | | |
| | | | 85 | | | | | 90 | | | | | | 95 | | | |

Leu Phe Ala Phe Lys Ala Asn Leu Gln Gln Arg Arg Val Lys Leu Thr
 100 105 110

Leu Leu Ser Lys Glu Ser Ala Val Leu Phe Leu Asn Val Leu Leu Ser
 115 120 125

Ile Ala Thr Val Ser Thr Phe Leu Gly Thr Phe Tyr Pro Met Leu Phe
 130 135 140

Gln Ala Met Asn Trp Gly Ser Ile Ser Val Gly Ala Pro Tyr Phe Asn
 145 150 155 160

Ser Ile Phe Leu Pro Leu Leu Thr Leu Ile Leu Ile Ala Met Val Phe
 165 170 175

Ser Leu Gly Leu His Trp Ala Lys Ala Asp Lys Gly Ile Leu Phe Lys
 180 185 190

Arg Ala Ala Leu Leu Leu Pro Ser Leu Leu Ile Ala Tyr Phe Met Ile
 195 200 205

Arg Gln
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 Thr His Pro Val His Ile Ser Met Gln Tyr Met Ala Asp Glu Val Lys
 1 5 10 15
 aaa tta aca aat ggt gaa gtg gtg atc cga att tac cca aat agc cag 96
 Lys Leu Thr Asn Gly Glu Val Val Ile Arg Ile Tyr Pro Asn Ser Gln
 20 25 30
 ctt ggt agc cag cgt gaa tca atg gaa tta ttg caa tcc ggg tca cta 144
 Leu Gly Ser Gln Arg Glu Ser Met Glu Leu Leu Gln Ser Gly Ser Leu
 35 40 45
 gat atg gca aaa tca aac gca agt gaa tta gaa gca ttt gag cca tct 192

| | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| Asp | Met | Ala | Lys | Ser | Asn | Ala | Ser | Glu | Leu | Glu | Ala | Phe | Glu | Pro | Ser | | |
| 50 | | | | | | 55 | | | | | 60 | | | | | | |
| tat | ggg | gca | tac | aat | att | ccg | tat | ctt | ttc | cat | aat | ggt | gat | cat | tat | 240 | |
| Tyr | Gly | Ala | Tyr | Asn | Ile | Pro | Tyr | Leu | Phe | His | Asn | Val | Asp | His | Tyr | | |
| 65 | | | | | 70 | | | | | 75 | | | | | 80 | | |
| tat | cgt | gct | cta | ctt | gat | cct | gaa | ggt | ggg | caa | aaa | att | ctt | gat | tca | 288 | |
| Tyr | Arg | Ala | Leu | Leu | Asp | Pro | Glu | Val | Gly | Gln | Lys | Ile | Leu | Asp | Ser | | |
| | | | | 85 | | | | | 90 | | | | | 95 | | | |
| tca | aag | ggc | aaa | ggg | ttc | att | ggg | ttg | act | tat | tat | gat | ggg | ggg | gcg | 336 | |
| Ser | Lys | Gly | Lys | Gly | Phe | Ile | Gly | Leu | Thr | Tyr | Tyr | Asp | Gly | Gly | Ala | | |
| | | | 100 | | | | | 105 | | | | | 110 | | | | |
| cgt | agt | ttc | tat | gcg | ggg | aag | gca | att | aaa | tcg | cct | gcg | gac | ctc | aaa | 384 | |
| Arg | Ser | Phe | Tyr | Ala | Gly | Lys | Ala | Ile | Lys | Ser | Pro | Ala | Asp | Leu | Lys | | |
| | | 115 | | | | | 120 | | | | | 125 | | | | | |
| ggg | atg | aaa | att | cgc | ggt | caa | cca | agc | cca | acc | gca | gta | gaa | atg | atc | 432 | |
| Gly | Met | Lys | Ile | Arg | Val | Gln | Pro | Ser | Pro | Thr | Ala | Val | Glu | Met | Ile | | |
| | 130 | | | | | 135 | | | | | 140 | | | | | | |
| aaa | tta | atg | ggg | gct | tct | cca | aca | cct | tta | gct | tat | ggg | gaa | ctc | tat | 480 | |
| Lys | Leu | Met | Gly | Ala | Ser | Pro | Thr | Pro | Leu | Ala | Tyr | Gly | Glu | Leu | Tyr | | |
| 145 | | | | | 150 | | | | | 155 | | | | | 160 | | |
| acc | gca | ctc | caa | caa | aaa | gtg | ggt | gat | ggc | gcg | gaa | aat | aac | caa | aca | 528 | |
| Thr | Ala | Leu | Gln | Gln | Lys | Val | Val | Asp | Gly | Ala | Glu | Asn | Asn | Gln | Thr | | |
| | | | | 165 | | | | 170 | | | | | | 175 | | | |
| gca | tta | acc | tta | tct | cgt | cat | ggg | gaa | gtg | gct | aaa | ttc | ttt | agt | gaa | 576 | |
| Ala | Leu | Thr | Leu | Ser | Arg | His | Gly | Glu | Val | Ala | Lys | Phe | Phe | Ser | Glu | | |
| | | | 180 | | | | | 185 | | | | | 190 | | | | |
| gat | gaa | cat | act | atg | att | cct | gat | gtg | ctc | gta | att | ggg | caa | aaa | tct | 624 | |
| Asp | Glu | His | Thr | Met | Ile | Pro | Asp | Val | Leu | Val | Ile | Gly | Gln | Lys | Ser | | |
| | 195 | | | | | 200 | | | | | | 205 | | | | | |
| tgg | gat | aaa | tta | act | cca | gaa | caa | caa | aat | gca | ctt | aaa | aaa | gcc | gct | 672 | |
| Trp | Asp | Lys | Leu | Thr | Pro | Glu | Gln | Gln | Asn | Ala | Leu | Lys | Lys | Ala | Ala | | |
| | 210 | | | | | 215 | | | | | 220 | | | | | | |
| gat | gat | tca | atg | atg | tat | cac | aaa | gat | tta | tgg | caa | aaa | atg | att | gct | 720 | |
| Asp | Asp | Ser | Met | Met | Tyr | His | Lys | Asp | Leu | Trp | Gln | Lys | Met | Ile | Ala | | |
| 225 | | | | | 230 | | | | | 235 | | | | | 240 | | |
| gaa | acc | act | caa | gaa | gct | aaa | gat | aaa | ttg | ggg | gta | gaa | ttt | gtg | aaa | 768 | |
| Glu | Thr | Thr | Gln | Glu | Ala | Lys | Asp | Lys | Leu | Gly | Val | Glu | Phe | Val | Lys | | |
| | | | | 245 | | | | | 250 | | | | | 255 | | | |
| gta | gat | aaa | caa | cct | ttc | att | gat | gca | aca | aaa | agc | atg | cat | gat | gcg | 816 | |
| Val | Asp | Lys | Gln | Pro | Phe | Ile | Asp | Ala | Thr | Lys | Ser | Met | His | Asp | Ala | | |
| | | | 260 | | | | | 265 | | | | | 270 | | | | |
| gca | aaa | gcc | aat | cct | ttg | ctt | aaa | gaa | tac | att | gaa | cgt | att | gat | agt | 864 | |
| Ala | Lys | Ala | Asn | Pro | Leu | Leu | Lys | Glu | Tyr | Ile | Glu | Arg | Ile | Asp | Ser | | |

275

280

285

ttg gca acc aag
 Leu Ala Thr Lys
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876

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Leu Gly Ser Gln Arg Glu Ser Met Glu Leu Leu Gln Ser Gly Ser Leu
 35 40 45

Asp Met Ala Lys Ser Asn Ala Ser Glu Leu Glu Ala Phe Glu Pro Ser
 50 55 60

Tyr Gly Ala Tyr Asn Ile Pro Tyr Leu Phe His Asn Val Asp His Tyr
 65 70 75 80

Tyr Arg Ala Leu Leu Asp Pro Glu Val Gly Gln Lys Ile Leu Asp Ser
 85 90 95

Ser Lys Gly Lys Gly Phe Ile Gly Leu Thr Tyr Tyr Asp Gly Gly Ala
 100 105 110

Arg Ser Phe Tyr Ala Gly Lys Ala Ile Lys Ser Pro Ala Asp Leu Lys
 115 120 125

Gly Met Lys Ile Arg Val Gln Pro Ser Pro Thr Ala Val Glu Met Ile
 130 135 140

Lys Leu Met Gly Ala Ser Pro Thr Pro Leu Ala Tyr Gly Glu Leu Tyr
 145 150 155 160

Thr Ala Leu Gln Gln Lys Val Val Asp Gly Ala Glu Asn Asn Gln Thr
 165 170 175

Ala Leu Thr Leu Ser Arg His Gly Glu Val Ala Lys Phe Phe Ser Glu
180 185 190

Asp Glu His Thr Met Ile Pro Asp Val Leu Val Ile Gly Gln Lys Ser
195 200 205

Trp Asp Lys Leu Thr Pro Glu Gln Gln Asn Ala Leu Lys Lys Ala Ala
210 215 220

Asp Asp Ser Met Met Tyr His Lys Asp Leu Trp Gln Lys Met Ile Ala
225 230 235 240

Glu Thr Thr Gln Glu Ala Lys Asp Lys Leu Gly Val Glu Phe Val Lys
245 250 255

Val Asp Lys Gln Pro Phe Ile Asp Ala Thr Lys Ser Met His Asp Ala
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275 280 285

Leu Ala Thr Lys
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ccc gtt gcc gtt ttg ccg gca gcc gcc gta tta atg ggg atc ggc tat 96
Pro Val Ala Val Leu Pro Ala Ala Ala Val Leu Met Gly Ile Gly Tyr
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tgg ctt gac ccg gac ggc tgg ggc gca aac agc caa ctt gcc gcc tta 144
Trp Leu Asp Pro Asp Gly Trp Gly Ala Asn Ser Gln Leu Ala Ala Leu
35 40 45

tta atc aag tcc ggc gcg gca atc atc gat aac atg ggc tta tta ttc 192
Leu Ile Lys Ser Gly Ala Ala Ile Ile Asp Asn Met Gly Leu Leu Phe

| 50 | 55 | 60 | |
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| gcc gtg ggc gta gca ttc ggg ttg tcc aaa gac aag cac ggt tct gct | | | 240 |
| Ala Val Gly Val Ala Phe Gly Leu Ser Lys Asp Lys His Gly Ser Ala | | | |
| 65 | 70 | 75 | 80 |
| gcg ctt tcc ggt tta gtg ggc tat tat gtg gtc act acc cta ctc gcc | | | 288 |
| Ala Leu Ser Gly Leu Val Gly Tyr Tyr Val Val Thr Thr Leu Leu Ala | | | |
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| cct ggc ggc gta gcg | | | 303 |
| Pro Gly Gly Val Ala | | | |
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| Pro Val Ala Val Leu Pro Ala Ala Ala Val Leu Met Gly Ile Gly Tyr | | |
| | 20 | 25 30 |

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|---|----|-------|
| Trp Leu Asp Pro Asp Gly Trp Gly Ala Asn Ser Gln Leu Ala Ala Leu | | |
| | 35 | 40 45 |

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|---|----|-------|
| Leu Ile Lys Ser Gly Ala Ala Ile Ile Asp Asn Met Gly Leu Leu Phe | | |
| | 50 | 55 60 |

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|---|----|-------|
| Ala Val Gly Val Ala Phe Gly Leu Ser Lys Asp Lys His Gly Ser Ala | | |
| 65 | 70 | 75 80 |

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|---|----|-------|
| Ala Leu Ser Gly Leu Val Gly Tyr Tyr Val Val Thr Thr Leu Leu Ala | | |
| | 85 | 90 95 |

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| Pro Gly Gly Val Ala |
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<210> 121
 <211> 590
 <212> DNA
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<220>
 <221> CDS

<222> (1) .. (588)

<400> 121

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Glu Tyr Lys Asn Leu Ala Val Ala Tyr Ile Arg Met Ser Thr Glu His
1 5 10 15

cag gaa ttt tca ccg gat ata caa cgt cgc ttc att caa aaa tat gct 96
Gln Glu Phe Ser Pro Asp Ile Gln Arg Arg Phe Ile Gln Lys Tyr Ala
20 25 30

aag gaa caa ggg ctt ata ctc act agg gaa tac cta gat gag gga agg 144
Lys Glu Gln Gly Leu Ile Leu Thr Arg Glu Tyr Leu Asp Glu Gly Arg
35 40 45

agt gga tta agc gca gaa aaa cgt cct cag ttt tta tca ctc att aat 192
Ser Gly Leu Ser Ala Glu Lys Arg Pro Gln Phe Leu Ser Leu Ile Asn
50 55 60

ttt gta caa tcc ggt aat gct gat ttt tca cat att ctt gtt tat gac 240
Phe Val Gln Ser Gly Asn Ala Asp Phe Ser His Ile Leu Val Tyr Asp
65 70 75 80

att agc cga tgg ggg cgc ttt cta aat att gat gaa tct gca cat tat 288
Ile Ser Arg Trp Gly Arg Phe Leu Asn Ile Asp Glu Ser Ala His Tyr
85 90 95

gaa caa att tgt tca aaa atg ggg att aaa gtg cat tac tgt gca gaa 336
Glu Gln Ile Cys Ser Lys Met Gly Ile Lys Val His Tyr Cys Ala Glu
100 105 110

cct ttt aag gga aac gac att ggt tct caa att ttt aaa gcg gta aaa 384
Pro Phe Lys Gly Asn Asp Ile Gly Ser Gln Ile Phe Lys Ala Val Lys
115 120 125

cgt tgg tct gcc gga gaa tac tgt cgt gag cta ggt gaa aaa gtt ttt 432
Arg Trp Ser Ala Gly Glu Tyr Cys Arg Glu Leu Gly Glu Lys Val Phe
130 135 140

aat ggg cag aag aat ttg att gag cgc gga ttt cgt caa ggt gga cca 480
Asn Gly Gln Lys Asn Leu Ile Glu Arg Gly Phe Arg Gln Gly Gly Pro
145 150 155 160

gct gga ttt ggg tta aga cgc cta tta tta agt gct gat ggt tcg cca 528
Ala Gly Phe Gly Leu Arg Arg Leu Leu Leu Ser Ala Asp Gly Ser Pro
165 170 175

aaa ttt gaa cta aaa acg ggt gac agg aag agt ttg cag tcg gat cgt 576
Lys Phe Glu Leu Lys Thr Gly Asp Arg Lys Ser Leu Gln Ser Asp Arg
180 185 190

gtc att ctt att gc 590
Val Ile Leu Ile
195

<210> 122

<211> 196
<212> PRT
<213> Actinobacillus actinomycetemcomitans

<400> 122

Glu Tyr Lys Asn Leu Ala Val Ala Tyr Ile Arg Met Ser Thr Glu His
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Gln Glu Phe Ser Pro Asp Ile Gln Arg Arg Phe Ile Gln Lys Tyr Ala
20 25 30

Lys Glu Gln Gly Leu Ile Leu Thr Arg Glu Tyr Leu Asp Glu Gly Arg
35 40 45

Ser Gly Leu Ser Ala Glu Lys Arg Pro Gln Phe Leu Ser Leu Ile Asn
50 55 60

Phe Val Gln Ser Gly Asn Ala Asp Phe Ser His Ile Leu Val Tyr Asp
65 70 75 80

Ile Ser Arg Trp Gly Arg Phe Leu Asn Ile Asp Glu Ser Ala His Tyr
85 90 95

Glu Gln Ile Cys Ser Lys Met Gly Ile Lys Val His Tyr Cys Ala Glu
100 105 110

Pro Phe Lys Gly Asn Asp Ile Gly Ser Gln Ile Phe Lys Ala Val Lys
115 120 125

Arg Trp Ser Ala Gly Glu Tyr Cys Arg Glu Leu Gly Glu Lys Val Phe
130 135 140

Asn Gly Gln Lys Asn Leu Ile Glu Arg Gly Phe Arg Gln Gly Gly Pro
145 150 155 160

Ala Gly Phe Gly Leu Arg Arg Leu Leu Leu Ser Ala Asp Gly Ser Pro
165 170 175

Lys Phe Glu Leu Lys Thr Gly Asp Arg Lys Ser Leu Gln Ser Asp Arg
180 185 190

Val Ile Leu Ile
195

<210> 123
 <211> 531
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1)..(531)

<400> 123

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| ttt tta acc aaa gat aaa atc aag cag gca ata cag gca cag caa cag | 48 |
| Phe Leu Thr Lys Asp Lys Ile Lys Gln Ala Ile Gln Ala Gln Gln Gln | |
| 1 5 10 15 | |

| | |
|---|----|
| gaa ctg tta cta caa gtg atc ccg cag gat tac ttc aat aat gat ctg | 96 |
| Glu Leu Leu Leu Gln Val Ile Pro Gln Asp Tyr Phe Asn Asn Asp Leu | |
| 20 25 30 | |

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|---|-----|
| acg cag gct tgt tat gca ccg caa gcg ggg aca tta caa gtc gtg gag | 144 |
| Thr Gln Ala Cys Tyr Ala Pro Gln Ala Gly Thr Leu Gln Val Val Glu | |
| 35 40 45 | |

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|---|-----|
| ata agc aaa ata tgc acg gca aag aaa gac ggc gtg act act gcc tat | 192 |
| Ile Ser Lys Ile Cys Thr Ala Lys Lys Asp Gly Val Thr Thr Ala Tyr | |
| 50 55 60 | |

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|---|-----|
| gcc ttt gaa agc acg gcg cat gat ggc tat tcc ggc gat att cat att | 240 |
| Ala Phe Glu Ser Thr Ala His Asp Gly Tyr Ser Gly Asp Ile His Ile | |
| 65 70 75 80 | |

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|---|-----|
| ttg gtg ggc atg aaa cct gat ggc gaa gtg ctt ggc gtg cgc att acg | 288 |
| Leu Val Gly Met Lys Pro Asp Gly Glu Val Leu Gly Val Arg Ile Thr | |
| 85 90 95 | |

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|---|-----|
| gaa cac cac gaa acc ccg gga tta ggc gat aaa att gaa acc cgc att | 336 |
| Glu His His Glu Thr Pro Gly Leu Gly Asp Lys Ile Glu Thr Arg Ile | |
| 100 105 110 | |

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|---|-----|
| tcc aac tgg gtt tta agt ttt gat cat cag gtt atc agc aac gaa aat | 384 |
| Ser Asn Trp Val Leu Ser Phe Asp His Gln Val Ile Ser Asn Glu Asn | |
| 115 120 125 | |

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|---|-----|
| gcc gca gaa tgg gcg gtg aaa aaa gac ggc ggt aaa ttc gat caa ttc | 432 |
| Ala Ala Glu Trp Ala Val Lys Lys Asp Gly Gly Lys Phe Asp Gln Phe | |
| 130 135 140 | |

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|---|-----|
| gcc ggt gcc acc atc acg ccc cgc gct gtg gtt aac caa gtg aaa cgg | 480 |
| Ala Gly Ala Thr Ile Thr Pro Arg Ala Val Val Asn Gln Val Lys Arg | |
| 145 150 155 160 | |

| | |
|---|-----|
| gcg gca ttg gct atg ctg gat aat ctg ccg aaa gag aga gaa agt gat | 528 |
| Ala Ala Leu Ala Met Leu Asp Asn Leu Pro Lys Glu Arg Glu Ser Asp | |
| 165 170 175 | |

| | |
|-----|-----|
| gga | 531 |
| Gly | |

<210> 124
 <211> 177
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 124

Phe Leu Thr Lys Asp Lys Ile Lys Gln Ala Ile Gln Ala Gln Gln Gln
 1 5 10 15

Glu Leu Leu Leu Gln Val Ile Pro Gln Asp Tyr Phe Asn Asn Asp Leu
 20 25 30

Thr Gln Ala Cys Tyr Ala Pro Gln Ala Gly Thr Leu Gln Val Val Glu
 35 40 45

Ile Ser Lys Ile Cys Thr Ala Lys Lys Asp Gly Val Thr Thr Ala Tyr
 50 55 60

Ala Phe Glu Ser Thr Ala His Asp Gly Tyr Ser Gly Asp Ile His Ile
 65 70 75 80

Leu Val Gly Met Lys Pro Asp Gly Glu Val Leu Gly Val Arg Ile Thr
 85 90 95

Glu His His Glu Thr Pro Gly Leu Gly Asp Lys Ile Glu Thr Arg Ile
 100 105 110

Ser Asn Trp Val Leu Ser Phe Asp His Gln Val Ile Ser Asn Glu Asn
 115 120 125

Ala Ala Glu Trp Ala Val Lys Lys Asp Gly Gly Lys Phe Asp Gln Phe
 130 135 140

Ala Gly Ala Thr Ile Thr Pro Arg Ala Val Val Asn Gln Val Lys Arg
 145 150 155 160

Ala Ala Leu Ala Met Leu Asp Asn Leu Pro Lys Glu Arg Glu Ser Asp
 165 170 175

Gly

<210> 125
 <211> 783
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<220>
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 <222> (1)..(783)

<400> 125
 atg gat aaa tta gac gaa aca caa gaa ctg caa caa acc gaa gcc aaa 48
 Met Asp Lys Leu Asp Glu Thr Gln Glu Leu Gln Gln Thr Glu Ala Lys
 1 5 10 15

agt gcg gtt gac aaa aaa caa cat ttt ttg aac gtt ggt tct gcc aac 96
 Ser Ala Val Asp Lys Lys Gln His Phe Leu Asn Val Gly Ser Ala Asn
 20 25 30

ggc ccc gaa ggg gtg aat aag cga aca agt gag ctt atg aat aat att 144
 Gly Pro Glu Gly Val Asn Lys Arg Thr Ser Glu Leu Met Asn Asn Ile
 35 40 45

tca aat gaa aaa agc att tgg aaa acg att ttc att cag ggc atc tgg 192
 Ser Asn Glu Lys Ser Ile Trp Lys Thr Ile Phe Ile Gln Gly Ile Trp
 50 55 60

acc aac aat tcc acc gtg gtg caa ctg ctt ggg ttg tgt ccg ctg ctg 240
 Thr Asn Asn Ser Thr Val Val Gln Leu Leu Gly Leu Cys Pro Leu Leu
 65 70 75 80

gcg gtg tcc aac tcc gtg acc aac gcc ctc ggg ctg ggt tta gcc acc 288
 Ala Val Ser Asn Ser Val Thr Asn Ala Leu Gly Leu Gly Leu Ala Thr
 85 90 95

atg ctt gtg ctg acg tgt acg aac acg gta gtt tct ctt ttc cgt aag 336
 Met Leu Val Leu Thr Cys Thr Asn Thr Val Val Ser Leu Phe Arg Lys
 100 105 110

cac atc ccc aat gaa atc cgc att ccg att tat gtg atg atc atc gca 384
 His Ile Pro Asn Glu Ile Arg Ile Pro Ile Tyr Val Met Ile Ile Ala
 115 120 125

acc acg gta acc gct gtg caa tta ttg atg aat gcc tat acc tac gcg 432
 Thr Thr Val Thr Ala Val Gln Leu Leu Met Asn Ala Tyr Thr Tyr Ala
 130 135 140

ctt tat caa tct ctc ggg att ttt att ccg ctc atc gtc acc aac tgt 480
 Leu Tyr Gln Ser Leu Gly Ile Phe Ile Pro Leu Ile Val Thr Asn Cys
 145 150 155 160

att gtg atc ggt cgc gcc gaa gcc ttt gct tcc aag aac agc att tcc 528
 Ile Val Ile Gly Arg Ala Glu Ala Phe Ala Ser Lys Asn Ser Ile Ser
 165 170 175

cat tcc gcc ttt gac ggt ttt tcc atg gga tta ggg atg tta ttc agt 576
 His Ser Ala Phe Asp Gly Phe Ser Met Gly Leu Gly Met Leu Phe Ser

| 180 | 185 | 190 | |
|---|-----|-----|-----|
| tta gta gcg ctc ggc ggc atc cgc gaa atc atc ggc aac ggt act tta | | | 624 |
| Leu Val Ala Leu Gly Gly Ile Arg Glu Ile Ile Gly Asn Gly Thr Leu | | | |
| 195 | 200 | 205 | |
| ttt gac ggc atc gaa aat ttg ctg ggc gat tgg gct aaa ttc atg cgg | | | 672 |
| Phe Asp Gly Ile Glu Asn Leu Leu Gly Asp Trp Ala Lys Phe Met Arg | | | |
| 210 | 215 | 220 | |
| att gaa ttt ttc cac aat gac agt aat ctg tta ctt gcg att ttg cct | | | 720 |
| Ile Glu Phe Phe His Asn Asp Ser Asn Leu Leu Ala Ile Leu Pro | | | |
| 225 | 230 | 235 | 240 |
| ccc ggc gca ttt att ggt tta gct ttg ttg tta gcc tta aaa aat gta | | | 768 |
| Pro Gly Ala Phe Ile Gly Leu Ala Leu Leu Leu Ala Leu Lys Asn Val | | | |
| 245 | 250 | 255 | |
| ata gat aca aaa aag | | | 783 |
| Ile Asp Thr Lys Lys | | | |
| 260 | | | |
| <210> 126 | | | |
| <211> 261 | | | |
| <212> PRT | | | |
| <213> Actinobacillus actinomycescomitans | | | |
| <400> 126 | | | |
| Met Asp Lys Leu Asp Glu Thr Gln Glu Leu Gln Gln Thr Glu Ala Lys | | | |
| 1 | 5 | 10 | 15 |
| Ser Ala Val Asp Lys Lys Gln His Phe Leu Asn Val Gly Ser Ala Asn | | | |
| 20 | 25 | 30 | |
| Gly Pro Glu Gly Val Asn Lys Arg Thr Ser Glu Leu Met Asn Asn Ile | | | |
| 35 | 40 | 45 | |
| Ser Asn Glu Lys Ser Ile Trp Lys Thr Ile Phe Ile Gln Gly Ile Trp | | | |
| 50 | 55 | 60 | |
| Thr Asn Asn Ser Thr Val Val Gln Leu Leu Gly Leu Cys Pro Leu Leu | | | |
| 65 | 70 | 75 | 80 |
| Ala Val Ser Asn Ser Val Thr Asn Ala Leu Gly Leu Gly Leu Ala Thr | | | |
| 85 | 90 | 95 | |
| Met Leu Val Leu Thr Cys Thr Asn Thr Val Val Ser Leu Phe Arg Lys | | | |
| 100 | 105 | 110 | |

His Ile Pro Asn Glu Ile Arg Ile Pro Ile Tyr Val Met Ile Ile Ala
 115 120 125

Thr Thr Val Thr Ala Val Gln Leu Leu Met Asn Ala Tyr Thr Tyr Ala
 130 135 140

Leu Tyr Gln Ser Leu Gly Ile Phe Ile Pro Leu Ile Val Thr Asn Cys
 145 150 155 160

Ile Val Ile Gly Arg Ala Glu Ala Phe Ala Ser Lys Asn Ser Ile Ser
 165 170 175

His Ser Ala Phe Asp Gly Phe Ser Met Gly Leu Gly Met Leu Phe Ser
 180 185 190

Leu Val Ala Leu Gly Gly Ile Arg Glu Ile Ile Gly Asn Gly Thr Leu
 195 200 205

Phe Asp Gly Ile Glu Asn Leu Leu Gly Asp Trp Ala Lys Phe Met Arg
 210 215 220

Ile Glu Phe Phe His Asn Asp Ser Asn Leu Leu Leu Ala Ile Leu Pro
 225 230 235 240

Pro Gly Ala Phe Ile Gly Leu Ala Leu Leu Leu Ala Leu Lys Asn Val
 245 250 255

Ile Asp Thr Lys Lys
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<210> 127
 <211> 627
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

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 <221> CDS
 <222> (1) .. (627)

<400> 127
 atg aat ttt act aaa acg cta tat att ttt aaa tat act ggc gaa ctt 48
 Met Asn Phe Thr Lys Thr Leu Tyr Ile Phe Lys Tyr Thr Gly Glu Leu
 1 5 10 15

ttc gcg att ttt att tat aat gaa gac gct atg ttt tta aat ata cat 96
 Phe Ala Ile Phe Ile Tyr Asn Glu Asp Ala Met Phe Leu Asn Ile His

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|---|-----|-----|-----|-----|
| cgt tat att ttt ctc aca ttc tgt tgg ggt aac atc atg aaa ttt gaa | | | | 144 |
| Arg Tyr Ile Phe Leu Thr Phe Cys Trp Gly Asn Ile Met Lys Phe Glu | | | | |
| | 35 | 40 | 45 | |
| gtc att tac aaa ttc ctg ttg ttg tgt gtg ctg att atc agt ttg ttg | | | | 192 |
| Val Ile Tyr Lys Phe Leu Leu Leu Cys Val Leu Ile Ile Ser Leu Leu | | | | |
| | 50 | 55 | 60 | |
| tgt gtt gtg ata agc ggc gcc gga tta ttc tac ggt tgg caa ttg agc | | | | 240 |
| Cys Val Val Ile Ser Gly Ala Gly Leu Phe Tyr Gly Trp Gln Leu Ser | | | | |
| | 65 | 70 | 75 | 80 |
| atg ctg ttc aat att cat gtg agc ttt gcc gtt ttg ctg gtc gcc gcg | | | | 288 |
| Met Leu Phe Asn Ile His Val Ser Phe Ala Val Leu Leu Val Ala Ala | | | | |
| | 85 | 90 | 95 | |
| ttg tta ctg cat att ctg aac cgc aaa aat aaa ttg gcg aaa atc aat | | | | 336 |
| Leu Leu Leu His Ile Leu Asn Arg Lys Asn Lys Leu Ala Lys Ile Asn | | | | |
| | 100 | 105 | 110 | |
| acc caa ttt gcc gat ttg gtc tta cac aat aaa tac ccg agt tat tgc | | | | 384 |
| Thr Gln Phe Ala Asp Leu Val Leu His Asn Lys Tyr Pro Ser Tyr Cys | | | | |
| | 115 | 120 | 125 | |
| aat tta gac cgc ttg atc atg acg ttc gag cat ttt tcc gtt gtg caa | | | | 432 |
| Asn Leu Asp Arg Leu Ile Met Thr Phe Glu His Phe Ser Val Val Gln | | | | |
| | 130 | 135 | 140 | |
| att gcc gaa cag tta aac ctg gat ttg gat gcg ctg cta aaa gaa ctc | | | | 480 |
| Ile Ala Glu Gln Leu Asn Leu Asp Leu Asp Ala Leu Leu Lys Glu Leu | | | | |
| | 145 | 150 | 155 | 160 |
| gcc gaa gga aaa ata aac gtc aaa aat tcc cac agc act tta cgg gag | | | | 528 |
| Ala Glu Gly Lys Ile Asn Val Lys Asn Ser His Ser Thr Leu Arg Glu | | | | |
| | 165 | 170 | 175 | |
| aat ttt ccc cat aat gat gaa aag att ttt gct gcg atc acc atc gtg | | | | 576 |
| Asn Phe Pro His Asn Asp Glu Lys Ile Phe Ala Ala Ile Thr Ile Val | | | | |
| | 180 | 185 | 190 | |
| ctg caa ctt cgt tta att aat cct atc cct gct ttt aac tta aaa gga | | | | 624 |
| Leu Gln Leu Arg Leu Ile Asn Pro Ile Pro Ala Phe Asn Leu Lys Gly | | | | |
| | 195 | 200 | 205 | |
| cat | | | | 627 |
| His | | | | |

<210> 128
 <211> 209
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans
 <400> 128

Met Asn Phe Thr Lys Thr Leu Tyr Ile Phe Lys Tyr Thr Gly Glu Leu
1 5 10 15

Phe Ala Ile Phe Ile Tyr Asn Glu Asp Ala Met Phe Leu Asn Ile His
20 25 30

Arg Tyr Ile Phe Leu Thr Phe Cys Trp Gly Asn Ile Met Lys Phe Glu
35 40 45

Val Ile Tyr Lys Phe Leu Leu Leu Cys Val Leu Ile Ile Ser Leu Leu
50 55 60

Cys Val Val Ile Ser Gly Ala Gly Leu Phe Tyr Gly Trp Gln Leu Ser
65 70 75 80

Met Leu Phe Asn Ile His Val Ser Phe Ala Val Leu Leu Val Ala Ala
85 90 95

Leu Leu Leu His Ile Leu Asn Arg Lys Asn Lys Leu Ala Lys Ile Asn
100 105 110

Thr Gln Phe Ala Asp Leu Val Leu His Asn Lys Tyr Pro Ser Tyr Cys
115 120 125

Asn Leu Asp Arg Leu Ile Met Thr Phe Glu His Phe Ser Val Val Gln
130 135 140

Ile Ala Glu Gln Leu Asn Leu Asp Leu Asp Ala Leu Leu Lys Glu Leu
145 150 155 160

Ala Glu Gly Lys Ile Asn Val Lys Asn Ser His Ser Thr Leu Arg Glu
165 170 175

Asn Phe Pro His Asn Asp Glu Lys Ile Phe Ala Ala Ile Thr Ile Val
180 185 190

Leu Gln Leu Arg Leu Ile Asn Pro Ile Pro Ala Phe Asn Leu Lys Gly
195 200 205

His

<210> 129
 <211> 663
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1)..(663)

<400> 129
 gtg caa tct tac gag cag caa agt aat aac ggc gtg ccg att caa ttc 48
 Val Gln Ser Tyr Glu Gln Gln Ser Asn Asn Gly Val Pro Ile Gln Phe
 1 5 10 15
 cag cag tta gac caa tca caa acc gtt gaa ccg acc gtg ttg gat aat 96
 Gln Gln Leu Asp Gln Ser Gln Thr Val Glu Pro Thr Val Leu Asp Asn
 20 25 30
 ctg acc ccg caa acc gat aac act gtc gcg caa caa cct gct gcg gaa 144
 Leu Thr Pro Gln Thr Asp Asn Thr Val Ala Gln Gln Pro Ala Ala Glu
 35 40 45
 acc aat acg caa aat gtc aat gcc ggc gcc ata gaa ccg caa gcg gtg 192
 Thr Asn Thr Gln Asn Val Asn Ala Gly Ala Ile Glu Pro Gln Ala Val
 50 55 60
 gaa caa ggg gca acc acc tcc gtt gct gag caa acg aca act gcg gcg 240
 Glu Gln Gly Ala Thr Thr Ser Val Ala Glu Gln Thr Thr Thr Ala Ala
 65 70 75 80
 gta gaa aat aaa ccg gca gaa gtc aaa ccg gaa gag gtc gaa acc gtt 288
 Val Glu Asn Lys Pro Ala Glu Val Lys Pro Glu Glu Val Glu Thr Val
 85 90 95
 aaa ccg agt gag cct gca aaa gcg caa gaa gcc gtc aaa ccg cgt caa 336
 Lys Pro Ser Glu Pro Ala Lys Ala Gln Glu Ala Val Lys Pro Arg Gln
 100 105 110
 cat cag gaa agc gtg aaa aaa gag ccg gtg aaa acc gat aaa gtg aaa 384
 His Gln Glu Ser Val Lys Lys Glu Pro Val Lys Thr Asp Lys Val Lys
 115 120 125
 cag gct gaa aaa gcg act gct aaa aat caa ccg act aaa tcg gca aaa 432
 Gln Ala Glu Lys Ala Thr Ala Lys Asn Gln Pro Thr Lys Ser Ala Lys
 130 135 140
 acc gaa aaa gaa gta cgg gat att tta gaa ggc aaa aca acg act atc 480
 Thr Glu Lys Glu Val Arg Asp Ile Leu Glu Gly Lys Thr Thr Thr Ile
 145 150 155 160
 acc aaa gca gca gcc ggt agc aaa acc tta acc att ccg caa ggc gtg 528
 Thr Lys Ala Ala Ala Gly Ser Lys Thr Leu Thr Ile Pro Gln Gly Val
 165 170 175
 acc tta atg cag gtg ttc cgt gac aac cat cta cct gtc ggt gat gtg 576
 Thr Leu Met Gln Val Phe Arg Asp Asn His Leu Pro Val Gly Asp Val
 180 185 190

aat gcc atg acc aaa gcc aaa ggc gta ggc aag gtg tta agc agc ttc 624
 Asn Ala Met Thr Lys Ala Lys Gly Val Gly Lys Val Leu Ser Ser Phe
 195 200 205

aag ccg ggt gat aag gta cag gtt tcc ctg aat gca caa 663
 Lys Pro Gly Asp Lys Val Gln Val Ser Leu Asn Ala Gln
 210 215 220

<210> 130
 <211> 221
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 130

Val Gln Ser Tyr Glu Gln Gln Ser Asn Asn Gly Val Pro Ile Gln Phe
 1 5 10 15

Gln Gln Leu Asp Gln Ser Gln Thr Val Glu Pro Thr Val Leu Asp Asn
 20 25 30

Leu Thr Pro Gln Thr Asp Asn Thr Val Ala Gln Gln Pro Ala Ala Glu
 35 40 45

Thr Asn Thr Gln Asn Val Asn Ala Gly Ala Ile Glu Pro Gln Ala Val
 50 55 60

Glu Gln Gly Ala Thr Thr Ser Val Ala Glu Gln Thr Thr Thr Ala Ala
 65 70 75 80

Val Glu Asn Lys Pro Ala Glu Val Lys Pro Glu Glu Val Glu Thr Val
 85 90 95

Lys Pro Ser Glu Pro Ala Lys Ala Gln Glu Ala Val Lys Pro Arg Gln
 100 105 110

His Gln Glu Ser Val Lys Lys Glu Pro Val Lys Thr Asp Lys Val Lys
 115 120 125

Gln Ala Glu Lys Ala Thr Ala Lys Asn Gln Pro Thr Lys Ser Ala Lys
 130 135 140

Thr Glu Lys Glu Val Arg Asp Ile Leu Glu Gly Lys Thr Thr Thr Ile
 145 150 155 160

Thr Lys Ala Ala Ala Gly Ser Lys Thr Leu Thr Ile Pro Gln Gly Val
165 170 175

Thr Leu Met Gln Val Phe Arg Asp Asn His Leu Pro Val Gly Asp Val
180 185 190

Asn Ala Met Thr Lys Ala Lys Gly Val Gly Lys Val Leu Ser Ser Phe
195 200 205

Lys Pro Gly Asp Lys Val Gln Val Ser Leu Asn Ala Gln
210 215 220

<210> 131

<211> 478

<212> DNA

<213> Actinobacillus actinomycetemcomitans

<220>

<221> CDS

<222> (1) .. (477)

<400> 131

atg tta aaa aaa atc tta cat tcc gca ctc atc ggt ttg gtt acg gca 48
Met Leu Lys Lys Ile Leu His Ser Ala Leu Ile Gly Leu Val Thr Ala
1 5 10 15

ggt gtg att ttg ttt gtg cta ccg aaa atc acc ggg aaa tcc gtg tta 96
Gly Val Ile Leu Phe Val Leu Pro Lys Ile Thr Gly Lys Ser Val Leu
20 25 30

ccg gag caa gaa atc gcc tct tat aaa gat gca gtg cgt att gct tcg 144
Pro Glu Gln Glu Ile Ala Ser Tyr Lys Asp Ala Val Arg Ile Ala Ser
35 40 45

ccg gcg gtt gtg aac gtt tat aat cag gcg ttt act tct tcg tcc gcg 192
Pro Ala Val Val Asn Val Tyr Asn Gln Ala Phe Thr Ser Ser Ser Ala
50 55 60

caa ttg cag gtg aat aac ctc ggt tcg ggc gtg atc atg tca aaa gac 240
Gln Leu Gln Val Asn Asn Leu Gly Ser Gly Val Ile Met Ser Lys Asp
65 70 75 80

ggt tat att ctg acg aac aaa cac gtt att caa aat gcc gat caa att 288
Gly Tyr Ile Leu Thr Asn Lys His Val Ile Gln Asn Ala Asp Gln Ile
85 90 95

gta gta gcg ttg caa aac ggg cat att ttt gat gcg gcg ctc att ggt 336
Val Val Ala Leu Gln Asn Gly His Ile Phe Asp Ala Ala Leu Ile Gly
100 105 110

tcc gat tct tta acg gat ttg gca gta tta aaa att aaa gcg gat aat 384
Ser Asp Ser Leu Thr Asp Leu Ala Val Leu Lys Ile Lys Ala Asp Asn
115 120 125

tta tcc acg att ccg caa aat ctc agc cgt ccg gtg cat gtg gga gat 432
 Leu Ser Thr Ile Pro Gln Asn Leu Ser Arg Pro Val His Val Gly Asp
 130 135 140

gtg gcg ctg gca atc ggc aat ccg tat aac ctg ggg caa agc gtg t 478
 Val Ala Leu Ala Ile Gly Asn Pro Tyr Asn Leu Gly Gln Ser Val
 145 150 155

<210> 132
 <211> 159
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 132

Met Leu Lys Lys Ile Leu His Ser Ala Leu Ile Gly Leu Val Thr Ala
 1 5 10 15

Gly Val Ile Leu Phe Val Leu Pro Lys Ile Thr Gly Lys Ser Val Leu
 20 25 30

Pro Glu Gln Glu Ile Ala Ser Tyr Lys Asp Ala Val Arg Ile Ala Ser
 35 40 45

Pro Ala Val Val Asn Val Tyr Asn Gln Ala Phe Thr Ser Ser Ser Ala
 50 55 60

Gln Leu Gln Val Asn Asn Leu Gly Ser Gly Val Ile Met Ser Lys Asp
 65 70 75 80

Gly Tyr Ile Leu Thr Asn Lys His Val Ile Gln Asn Ala Asp Gln Ile
 85 90 95

Val Val Ala Leu Gln Asn Gly His Ile Phe Asp Ala Ala Leu Ile Gly
 100 105 110

Ser Asp Ser Leu Thr Asp Leu Ala Val Leu Lys Ile Lys Ala Asp Asn
 115 120 125

Leu Ser Thr Ile Pro Gln Asn Leu Ser Arg Pro Val His Val Gly Asp
 130 135 140

Val Ala Leu Ala Ile Gly Asn Pro Tyr Asn Leu Gly Gln Ser Val
 145 150 155

<210> 133
 <211> 537
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1)..(537)

<400> 133
 gcc ggc tgg cag ata aaa aat aac aaa cct ttt gac ggt aaa gac tgg 48
 Ala Gly Trp Gln Ile Lys Asn Asn Lys Pro Phe Asp Gly Lys Asp Trp
 1 5 10 15
 acc cgt tgg gtc gat gcg aga gaa tcc gga gcc att gcc ggt gca gta 96
 Thr Arg Trp Val Asp Ala Arg Glu Ser Gly Ala Ile Ala Gly Ala Val
 20 25 30
 gaa ttt aac aat tat gtc aat tct cat aaa ggc aaa atg ttc tat gtg 144
 Glu Phe Asn Asn Tyr Val Asn Ser His Lys Gly Lys Met Phe Tyr Val
 35 40 45
 tca aat cgc aaa gac agt aat gaa aaa gca ggt acc att gat gac atg 192
 Ser Asn Arg Lys Asp Ser Asn Glu Lys Ala Gly Thr Ile Asp Asp Met
 50 55 60
 aaa cgt tta ggc ttt acc ggt gtt gat gaa tca tcc ctt tat ctg aaa 240
 Lys Arg Leu Gly Phe Thr Gly Val Asp Glu Ser Ser Leu Tyr Leu Lys
 65 70 75 80
 aaa gat aaa tcc gcc aaa tct gcc cgt ttt gca gaa att gaa agt caa 288
 Lys Asp Lys Ser Ala Lys Ser Ala Arg Phe Ala Glu Ile Glu Ser Gln
 85 90 95
 ggc tat gac atc gtg ctt tat gta ggc gac aac ctg gat gat ttc ggt 336
 Gly Tyr Asp Ile Val Leu Tyr Val Gly Asp Asn Leu Asp Asp Phe Gly
 100 105 110
 gat gca aca cac ggt aaa tta aat gcg gat cgt cga gac ttt gtt gct 384
 Asp Ala Thr His Gly Lys Leu Asn Ala Asp Arg Arg Asp Phe Val Ala
 115 120 125
 aaa aac cag gcg aaa ttc ggt aaa act tat atc gtt tta cct aat ccg 432
 Lys Asn Gln Ala Lys Phe Gly Lys Thr Tyr Ile Val Leu Pro Asn Pro
 130 135 140
 aat tac ggt ggt tgg gaa ggc ggt tta gcc aaa gac tac ttt aaa ggt 480
 Asn Tyr Gly Gly Trp Glu Gly Gly Leu Ala Lys Asp Tyr Phe Lys Gly
 145 150 155 160
 gat tcc caa agc aaa gtt gat gcc cgc tta aat gta att aag gca tgg 528
 Asp Ser Gln Ser Lys Val Asp Ala Arg Leu Asn Val Ile Lys Ala Trp
 165 170 175
 agt gga aaa 537
 Ser Gly Lys

<210> 134
 <211> 179
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 134

Ala Gly Trp Gln Ile Lys Asn Asn Lys Pro Phe Asp Gly Lys Asp Trp
 1 5 10 15

Thr Arg Trp Val Asp Ala Arg Glu Ser Gly Ala Ile Ala Gly Ala Val
 20 25 30

Glu Phe Asn Asn Tyr Val Asn Ser His Lys Gly Lys Met Phe Tyr Val
 35 40 45

Ser Asn Arg Lys Asp Ser Asn Glu Lys Ala Gly Thr Ile Asp Asp Met
 50 55 60

Lys Arg Leu Gly Phe Thr Gly Val Asp Glu Ser Ser Leu Tyr Leu Lys
 65 70 75 80

Lys Asp Lys Ser Ala Lys Ser Ala Arg Phe Ala Glu Ile Glu Ser Gln
 85 90 95

Gly Tyr Asp Ile Val Leu Tyr Val Gly Asp Asn Leu Asp Asp Phe Gly
 100 105 110

Asp Ala Thr His Gly Lys Leu Asn Ala Asp Arg Arg Asp Phe Val Ala
 115 120 125

Lys Asn Gln Ala Lys Phe Gly Lys Thr Tyr Ile Val Leu Pro Asn Pro
 130 135 140

Asn Tyr Gly Gly Trp Glu Gly Gly Leu Ala Lys Asp Tyr Phe Lys Gly
 145 150 155 160

Asp Ser Gln Ser Lys Val Asp Ala Arg Leu Asn Val Ile Lys Ala Trp
 165 170 175

Ser Gly Lys

<210> 135
 <211> 765
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1)..(765)

<400> 135
 atg tgg ata ttt tac aac acc cgg aca ttc gtg ccg aat tac cgg ctt 48
 Met Trp Ile Phe Tyr Asn Thr Arg Thr Phe Val Pro Asn Tyr Arg Leu
 1 5 10 15
 atg cca act ggc cga cat tcc cgc aat tat ggg tgg aag gcg agc tca 96
 Met Pro Thr Gly Arg His Ser Arg Asn Tyr Gly Trp Lys Ala Ser Ser
 20 25 30
 tcg gtg gtt gcg aca tcg tgt tgg aaa tgt acc aac aag gtg agc tta 144
 Ser Val Val Ala Thr Ser Cys Trp Lys Cys Thr Asn Lys Val Ser Leu
 35 40 45
 aaa cct tgt tac aag agg ttg ccg caa gac atc cgc aag cgt aaa aac 192
 Lys Pro Cys Tyr Lys Arg Leu Pro Gln Asp Ile Arg Lys Arg Lys Asn
 50 55 60
 gcg ttt caa aat gac cgt act ttg gtt tcc gga gtg ccg ttt ttt gct 240
 Ala Phe Gln Asn Asp Arg Thr Leu Val Ser Gly Val Arg Phe Phe Ala
 65 70 75 80
 gct tgg cgc agg gaa aaa cag gcg gtt tgt gct ata att ctc cgc aaa 288
 Ala Trp Arg Arg Glu Lys Gln Ala Val Cys Ala Ile Ile Leu Arg Lys
 85 90 95
 ttt tta ccg cac ttt agg atc aat atg tcg ttt caa ttc aac gcg atc 336
 Phe Leu Pro His Phe Arg Ile Asn Met Ser Phe Gln Phe Asn Ala Ile
 100 105 110
 gcc tta ctt ttg gtg att tta att tta tta ggt gta ctc agc cac aac 384
 Ala Leu Leu Leu Val Ile Leu Ile Leu Leu Gly Val Leu Ser His Asn
 115 120 125
 agt tcc atc acc att tcc gct gcc gta ttg ctc atc atg caa caa acc 432
 Ser Ser Ile Thr Ile Ser Ala Ala Val Leu Leu Ile Met Gln Gln Thr
 130 135 140
 ttg ctc gca aaa tat att cct tac ttg gaa aaa tac ggc ttg agc atc 480
 Leu Leu Ala Lys Tyr Ile Pro Tyr Leu Glu Lys Tyr Gly Leu Ser Ile
 145 150 155 160
 ggt atc gta att tta acc atc ggc gta cta agc ccg ttg gtt tcc ggc 528
 Gly Ile Val Ile Leu Thr Ile Gly Val Leu Ser Pro Leu Val Ser Gly
 165 170 175
 aga att caa ctg cct ggc ttg tcg gca ttt ttt agc tgg cga atg ttt 576
 Arg Ile Gln Leu Pro Gly Leu Ser Ala Phe Phe Ser Trp Arg Met Phe
 180 185 190

| | |
|---|-----|
| gtt gcc att ggc gtc ggc gta tta gtg gcg tgg ctt gcc ggc aaa ggc | 624 |
| Val Ala Ile Gly Val Gly Val Leu Val Ala Trp Leu Ala Gly Lys Gly | |
| 195 200 205 | |
| | |
| gtt ccg ctc atg ggg gaa gag cct gtt ctg gta acc ggc ttg gtt atc | 672 |
| Val Pro Leu Met Gly Glu Glu Pro Val Leu Val Thr Gly Leu Val Ile | |
| 210 215 220 | |
| | |
| ggc acc att atc ggc gtt tct ttt ctc ggt ggt att ccc gtt ggt ccc | 720 |
| Gly Thr Ile Ile Gly Val Ser Phe Leu Gly Gly Ile Pro Val Gly Pro | |
| 225 230 235 240 | |
| | |
| ctt att gcg gca ggg att ttg gca tta tta ata gga aaa ttt taa | 765 |
| Leu Ile Ala Ala Gly Ile Leu Ala Leu Leu Ile Gly Lys Phe | |
| 245 250 | |

<210> 136
 <211> 254
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 136

| |
|---|
| Met Trp Ile Phe Tyr Asn Thr Arg Thr Phe Val Pro Asn Tyr Arg Leu |
| 1 5 10 15 |

| |
|---|
| Met Pro Thr Gly Arg His Ser Arg Asn Tyr Gly Trp Lys Ala Ser Ser |
| 20 25 30 |

| |
|---|
| Ser Val Val Ala Thr Ser Cys Trp Lys Cys Thr Asn Lys Val Ser Leu |
| 35 40 45 |

| |
|---|
| Lys Pro Cys Tyr Lys Arg Leu Pro Gln Asp Ile Arg Lys Arg Lys Asn |
| 50 55 60 |

| |
|---|
| Ala Phe Gln Asn Asp Arg Thr Leu Val Ser Gly Val Arg Phe Phe Ala |
| 65 70 75 80 |

| |
|---|
| Ala Trp Arg Arg Glu Lys Gln Ala Val Cys Ala Ile Ile Leu Arg Lys |
| 85 90 95 |

| |
|---|
| Phe Leu Pro His Phe Arg Ile Asn Met Ser Phe Gln Phe Asn Ala Ile |
| 100 105 110 |

| |
|---|
| Ala Leu Leu Leu Val Ile Leu Ile Leu Leu Gly Val Leu Ser His Asn |
| 115 120 125 |

Ser Ser Ile Thr Ile Ser Ala Ala Val Leu Leu Ile Met Gln Gln Thr
130 135 140

Leu Leu Ala Lys Tyr Ile Pro Tyr Leu Glu Lys Tyr Gly Leu Ser Ile
145 150 155 160

Gly Ile Val Ile Leu Thr Ile Gly Val Leu Ser Pro Leu Val Ser Gly
165 170 175

Arg Ile Gln Leu Pro Gly Leu Ser Ala Phe Phe Ser Trp Arg Met Phe
180 185 190

Val Ala Ile Gly Val Gly Val Leu Val Ala Trp Leu Ala Gly Lys Gly
195 200 205

Val Pro Leu Met Gly Glu Glu Pro Val Leu Val Thr Gly Leu Val Ile
210 215 220

Gly Thr Ile Ile Gly Val Ser Phe Leu Gly Gly Ile Pro Val Gly Pro
225 230 235 240

Leu Ile Ala Ala Gly Ile Leu Ala Leu Leu Ile Gly Lys Phe
245 250

<210> 137
<211> 387
<212> DNA
<213> Actinobacillus actinomycetemcomitans

<220>
<221> CDS
<222> (1)..(387)

<400> 137
atg aaa aac aaa tgg tta ttg att gcc gcc gtg agc ggt ttt tta tgt 48
Met Lys Asn Lys Trp Leu Leu Ile Ala Ala Val Ser Gly Phe Leu Cys
1 5 10 15

gtg act atc ggt gcg ttt gcg gcg cac ggt tta agc caa gtg ttg gac 96
Val Thr Ile Gly Ala Phe Ala Ala His Gly Leu Ser Gln Val Leu Asp
20 25 30

gcg aaa gcc tta gcg tgg att gac acc ggc gtg aaa tat caa atg ttc 144
Ala Lys Ala Leu Ala Trp Ile Asp Thr Gly Val Lys Tyr Gln Met Phe
35 40 45

cac acc ctc gcc atc atg gga atc ggc atc gca caa tta tgt cgc gaa 192
His Thr Leu Ala Ile Met Gly Ile Gly Ile Ala Gln Leu Cys Arg Glu
50 55 60

cca ttt gcc gcc aac aaa agc gcc aat gtt gcc gcc ggc gcg tgg tca 240
Pro Phe Ala Ala Asn Lys Ser Ala Asn Val Ala Ala Gly Ala Trp Ser
65 70 75 80

ttc gga atc ctt ctc ttt agc ggc agt tta tac gcc ctc gca ctt ggc 288
Phe Gly Ile Leu Leu Phe Ser Gly Ser Leu Tyr Ala Leu Ala Leu Gly
85 90 95

tca ggt aaa ttt atg gtt tgg ctc acg ccc atc ggc ggc acg cta ttt 336
Ser Gly Lys Phe Met Val Trp Leu Thr Pro Ile Gly Gly Thr Leu Phe
100 105 110

| | |
|---|-----|
| tta atc ggc tgg ctt ggt tta gct tac ggc gct ttc aaa agt aaa tca | 384 |
| Leu Ile Gly Trp Leu Gly Leu Ala Tyr Gly Ala Phe Lys Ser Lys Ser | |
| 115 120 125 | |

| | |
|-----|-----|
| gaa | 387 |
| Glu | |

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<210> 138
<211> 129
<212> PRT
<213> Actinobacillus actinomycetemcomitans
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<400> 138

Met Lys Asn Lys Trp Leu Leu Ile Ala Ala Val Ser Gly Phe Leu Cys
1 5 10 15

Val Thr Ile Gly Ala Phe Ala Ala His Gly Leu Ser Gln Val Leu Asp
20 25 30

Ala Lys Ala Leu Ala Trp Ile Asp Thr Gly Val Lys Tyr Gln Met Phe
35 40 45

His Thr Leu Ala Ile Met Gly Ile Gly Ile Ala Gln Leu Cys Arg Glu
50 55 60

Pro Phe Ala Ala Asn Lys Ser Ala Asn Val Ala Ala Gly Ala Trp Ser
65 70 75 80

Phe Gly Ile Leu Leu Phe Ser Gly Ser Leu Tyr Ala Leu Ala Leu Gly
85 90 95

Ser Gly Lys Phe Met Val Trp Leu Thr Pro Ile Gly Gly Thr Leu Phe
100 105 110

Leu Ile Gly Trp Leu Gly Leu Ala Tyr Gly Ala Phe Lys Ser Lys Ser
 115 120 125

Glu

<210> 139
 <211> 684
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1) .. (684)

<400> 139
 atc aat ttg gca cat aat tat cag caa aaa tgg cag gcg gac atc ggt 48
 Ile Asn Leu Ala His Asn Tyr Gln Gln Lys Trp Gln Ala Asp Ile Gly
 1 5 10 15
 cgg cac gcc gtg cag tat ttt gct tac gat aac ccg cgg gcg gat ttt 96
 Arg His Ala Val Gln Tyr Phe Ala Tyr Asp Asn Pro Arg Ala Asp Phe
 20 25 30
 tac gcc gaa caa att cat ttc tcc gaa caa ggc gcc tat ttc tta ctc 144
 Tyr Ala Glu Gln Ile His Phe Ser Glu Gln Gly Ala Tyr Phe Leu Leu
 35 40 45
 cac acg ccg caa ggc cgc gtg caa atc aat tca ccg tat ttg ggt gag 192
 His Thr Pro Gln Gly Arg Val Gln Ile Asn Ser Pro Tyr Leu Gly Glu
 50 55 60
 cat aat atc tct aat gcg ttg gcg gca act gcc ttg gcg atg aac gtg 240
 His Asn Ile Ser Asn Ala Leu Ala Ala Thr Ala Leu Ala Met Asn Val
 65 70 75 80
 ggt gcc acc acg gcg cag gtg aaa aaa ggg ttg gaa acg ccc tct ttg 288
 Gly Ala Thr Thr Ala Gln Val Lys Lys Gly Leu Glu Thr Pro Ser Leu
 85 90 95
 gtg aaa ggg cgt ttg ttc ccg att cag cct tgt gaa aat ctg tta ttg 336
 Val Lys Gly Arg Leu Phe Pro Ile Gln Pro Cys Glu Asn Leu Leu Leu
 100 105 110
 ctg gac gat act tac aac gcc aat gtg gga tct atg aaa tcg gcg att 384
 Leu Asp Asp Thr Tyr Asn Ala Asn Val Gly Ser Met Lys Ser Ala Ile
 115 120 125
 tcc gtg tta caa aaa tat cct gct ttt cgc gtc ttt gtt gtt ggt gat 432
 Ser Val Leu Gln Lys Tyr Pro Ala Phe Arg Val Phe Val Val Gly Asp
 130 135 140
 atg ggc gaa tta ggc gat aat gcg caa ctt tgc cat caa gag gtg ggg 480
 Met Gly Glu Leu Gly Asp Asn Ala Gln Leu Cys His Gln Glu Val Gly
 145 150 155 160

gag ttc gct cat gcc gcc aag tta gac tta gtg ctt tct ttc ggg tgt 528
 Glu Phe Ala His Ala Ala Lys Leu Asp Leu Val Leu Ser Phe Gly Cys
 165 170 175

tcc agt ggc gtt ata agt gcg gtt aat tcg gga cgc cat ttt acc gat 576
 Ser Ser Gly Val Ile Ser Ala Val Asn Ser Gly Arg His Phe Thr Asp
 180 185 190

aaa acg gaa ctt gta act tat tta aca ccg att att caa caa caa tta 624
 Lys Thr Glu Leu Val Thr Tyr Leu Thr Pro Ile Ile Gln Gln Gln Leu
 195 200 205

gca caa caa aaa gtc gtt gtt ttg gtg aaa gga tca cgc agc atg aaa 672
 Ala Gln Gln Lys Val Val Val Leu Val Lys Gly Ser Arg Ser Met Lys
 210 215 220

atg gaa gaa gtg 684
 Met Glu Glu Val
 225

<210> 140
 <211> 228
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 140

Ile Asn Leu Ala His Asn Tyr Gln Gln Lys Trp Gln Ala Asp Ile Gly
 1 5 10 15

Arg His Ala Val Gln Tyr Phe Ala Tyr Asp Asn Pro Arg Ala Asp Phe
 20 25 30

Tyr Ala Glu Gln Ile His Phe Ser Glu Gln Gly Ala Tyr Phe Leu Leu
 35 40 45

His Thr Pro Gln Gly Arg Val Gln Ile Asn Ser Pro Tyr Leu Gly Glu
 50 55 60

His Asn Ile Ser Asn Ala Leu Ala Ala Thr Ala Leu Ala Met Asn Val
 65 70 75 80

Gly Ala Thr Thr Ala Gln Val Lys Lys Gly Leu Glu Thr Pro Ser Leu
 85 90 95

Val Lys Gly Arg Leu Phe Pro Ile Gln Pro Cys Glu Asn Leu Leu Leu
 100 105 110

ggt caa acc aga aaa atg aac gaa ccg cct acg ccg gaa gaa tat gaa 240
 Gly Gln Thr Arg Lys Met Asn Glu Pro Pro Thr Pro Glu Glu Tyr Glu
 65 70 75 80

ata ttt aaa agg tcc att gta acc ttt 267
 Ile Phe Lys Arg Ser Ile Val Thr Phe
 85

<210> 142
 <211> 89
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 142

Asp Gly Gly Lys Ala Gly Ser Arg Tyr Ala Gly Ile Ile Tyr Lys Ser
 1 5 10 15

Val Lys Pro Tyr Phe Arg Gly Asp Ser Arg Phe Phe Gly Lys Val Cys
 20 25 30

Asp Ile Arg Ile Glu Leu Ser Ser Asp Gly Thr Ile Leu Ser Tyr Gln
 35 40 45

Lys Val Ser Gly Pro Asn Asp Leu Cys Gly Ala Ala Leu Asn Ala Ile
 50 55 60

Gly Gln Thr Arg Lys Met Asn Glu Pro Pro Thr Pro Glu Glu Tyr Glu
 65 70 75 80

Ile Phe Lys Arg Ser Ile Val Thr Phe
 85

<210> 143
 <211> 683
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1)..(681)

<400> 143

ggt gcc tta tat ttt gta ttc agt ctg atg ggc gtg ttc gcc agt ttg 48
 Gly Ala Leu Tyr Phe Val Phe Ser Leu Met Gly Val Phe Ala Ser Leu
 1 5 10 15

tta tcc acc gcg cgc ggc ggc tgg att ggt atc cct ttt gtt ctc ctg 96
 Leu Ser Thr Ala Arg Gly Gly Trp Ile Gly Ile Pro Phe Val Leu Leu

<212> PRT
<213> Actinobacillus actinomycetemcomitans

<400> 144

Gly Ala Leu Tyr Phe Val Phe Ser Leu Met Gly Val Phe Ala Ser Leu
1 5 10 15

Leu Ser Thr Ala Arg Gly Gly Trp Ile Gly Ile Pro Phe Val Leu Leu
20 25 30

Leu Ile Leu Phe Ala Tyr Arg Arg Tyr Leu Ser Lys Lys Phe Val Ala
35 40 45

Gly Phe Phe Ile Val Leu Ala Leu Ile Val Thr Thr Val Ala Met Leu
50 55 60

Pro Asn Thr Lys Ile Lys Glu Arg Ile Ala Ala Ala Glu Tyr Asp Ile
65 70 75 80

Ile Ala Tyr Phe Gln Gln Asn Asn Gly Ser Thr Ser Val Gly Ala Arg
85 90 95

Phe Asp Met Trp Lys Ser Val Met Leu Met Thr Gln Glu Lys Pro Ile
100 105 110

Phe Gly Trp Gly Val Gln Gly Val Ser Glu Lys Arg Lys Leu Gln Tyr
115 120 125

Glu Gln Gly Leu Ile Ser Gln Tyr Ala Ala Ala Phe Asn His Ala His
130 135 140

Asn Gln Tyr Phe Asp Asp Leu Ser Lys Arg Gly Ala Leu Gly Leu Leu
145 150 155 160

Ala Leu Leu Gly Val Phe Leu Val Pro Leu Arg Phe Phe Ile Arg His
165 170 175

Leu Lys Ser Val Asp Leu Glu Leu Lys Leu Val Ser Leu Leu Gly Ala
180 185 190

Val His Ile Val Ser Val Met Phe Tyr Cys Phe Ser Gln Gly Phe Phe
195 200 205

Ser His Asn Ser Gly Asn Ile Phe Tyr Phe Phe Pro Val Ile Val Phe
 210 215 220

Tyr Ala Leu
 225

<210> 145
 <211> 408
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1)..(408)

<400> 145
 gcc gat tat ggc atc gac tat ggt aac gat ttc gta ggt atc att gaa 48
 Ala Asp Tyr Gly Ile Asp Tyr Gly Asn Asp Phe Val Gly Ile Ile Glu
 1 5 10 15
 gga aaa ttg aag tta aac aaa tca acg tta cat gat aat aac gcc tcc 96
 Gly Lys Leu Lys Leu Asn Lys Ser Thr Leu His Asp Asn Asn Ala Ser
 20 25 30
 ggc tac cgt ggc aaa ctg aac gaa aag gca cgt ttg ggc gta agt tac 144
 Gly Tyr Arg Gly Lys Leu Asn Glu Lys Ala Arg Leu Gly Val Ser Tyr
 35 40 45
 tta caa ggc tat cgc gta aca cca agc att ctt cct tat gcc aaa gtt 192
 Leu Gln Gly Tyr Arg Val Thr Pro Ser Ile Leu Pro Tyr Ala Lys Val
 50 55 60
 ggg gtg caa act gct aaa ttt gaa agt gag gtt cgt aca cgc aac tac 240
 Gly Val Gln Thr Ala Lys Phe Glu Ser Glu Val Arg Thr Arg Asn Tyr
 65 70 75 80
 tca gct acg cat agt gat acc aaa aac ggt ata ggt ttt ggt gcg ggt 288
 Ser Ala Thr His Ser Asp Thr Lys Asn Gly Ile Gly Phe Gly Ala Gly
 85 90 95
 gtt aag gtc aat ctg gta ccg gac ttt gag cta agc ttg gaa tat tta 336
 Val Lys Val Asn Leu Val Pro Asp Phe Glu Leu Ser Leu Glu Tyr Leu
 100 105 110
 agg act cat aac aaa ttt gat ggt caa aag tta aga ggt aat gta tat 384
 Arg Thr His Asn Lys Phe Asp Gly Gln Lys Leu Arg Gly Asn Val Tyr
 115 120 125
 agc acc aac gct aca tat cgt ttc 408
 Ser Thr Asn Ala Thr Tyr Arg Phe
 130 135

<210> 146
 <211> 136

<212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 146

Ala Asp Tyr Gly Ile Asp Tyr Gly Asn Asp Phe Val Gly Ile Ile Glu
 1 5 10 15

Gly Lys Leu Lys Leu Asn Lys Ser Thr Leu His Asp Asn Asn Ala Ser
 20 25 30

Gly Tyr Arg Gly Lys Leu Asn Glu Lys Ala Arg Leu Gly Val Ser Tyr
 35 40 45

Leu Gln Gly Tyr Arg Val Thr Pro Ser Ile Leu Pro Tyr Ala Lys Val
 50 55 60

Gly Val Gln Thr Ala Lys Phe Glu Ser Glu Val Arg Thr Arg Asn Tyr
 65 70 75 80

Ser Ala Thr His Ser Asp Thr Lys Asn Gly Ile Gly Phe Gly Ala Gly
 85 90 95

Val Lys Val Asn Leu Val Pro Asp Phe Glu Leu Ser Leu Glu Tyr Leu
 100 105 110

Arg Thr His Asn Lys Phe Asp Gly Gln Lys Leu Arg Gly Asn Val Tyr
 115 120 125

Ser Thr Asn Ala Thr Tyr Arg Phe
 130 135

<210> 147
 <211> 426
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1) .. (426)

<400> 147

atg aaa aaa att ctt acc gca ctt ttt tgc agt tgt ctc att tcc cct 48
 Met Lys Lys Ile Leu Thr Ala Leu Phe Cys Ser Cys Leu Ile Ser Pro
 1 5 10 15

ctc aca aac gct gaa acc ttg tct gat ggt tta cca cca cag gca gct 96
 Leu Thr Asn Ala Glu Thr Leu Ser Asp Gly Leu Pro Pro Gln Ala Ala

20 25 30

ggg gat tat gtg ttc ttg gac ccg cat caa aac aat acg gat ata caa 144
 Gly Asp Tyr Val Phe Leu Asp Pro His Gln Asn Asn Thr Asp Ile Gln
 35 40 45

ttt cgt tta aaa ctt aaa ggc aaa caa tgg ctg gca gac ggt tcc caa 192
 Phe Arg Leu Lys Leu Lys Gly Lys Gln Trp Leu Ala Asp Gly Ser Gln
 50 55 60

aat gcc ggc aaa agc tgg tcg cct gtg tgc gaa gtc agt ggc gaa tgc 240
 Asn Ala Gly Lys Ser Trp Ser Pro Val Cys Glu Val Ser Gly Glu Cys
 65 70 75 80

aaa ctg gag aca tcc tcc aaa gcg gaa atc gaa cgc ttc ttt gag caa 288
 Lys Leu Glu Thr Ser Ser Lys Ala Glu Ile Glu Arg Phe Phe Glu Gln
 85 90 95

tat ccg caa gta cta aac cga aca gat gtc agc tgc att cac aat atg 336
 Tyr Pro Gln Val Leu Asn Arg Thr Asp Val Ser Cys Ile His Asn Met
 100 105 110

gcg ttc gct ttc tgc ggg tta act tta gat aaa aaa acc gat tat gtg 384
 Ala Phe Ala Phe Cys Gly Leu Thr Leu Asp Lys Lys Thr Asp Tyr Val
 115 120 125

atg gtc gca tta gtg acc aat ccg cca caa gtc aca tcg tat 426
 Met Val Ala Leu Val Thr Asn Pro Pro Gln Val Thr Ser Tyr
 130 135 140

<210> 148
 <211> 142
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans
 <400> 148

Met Lys Lys Ile Leu Thr Ala Leu Phe Cys Ser Cys Leu Ile Ser Pro
 1 5 10 15

Leu Thr Asn Ala Glu Thr Leu Ser Asp Gly Leu Pro Pro Gln Ala Ala
 20 25 30

Gly Asp Tyr Val Phe Leu Asp Pro His Gln Asn Asn Thr Asp Ile Gln
 35 40 45

Phe Arg Leu Lys Leu Lys Gly Lys Gln Trp Leu Ala Asp Gly Ser Gln
 50 55 60

Asn Ala Gly Lys Ser Trp Ser Pro Val Cys Glu Val Ser Gly Glu Cys
 65 70 75 80

Lys Leu Glu Thr Ser Ser Lys Ala Glu Ile Glu Arg Phe Phe Glu Gln
85 90 95

Tyr Pro Gln Val Leu Asn Arg Thr Asp Val Ser Cys Ile His Asn Met
100 105 110

Ala Phe Ala Phe Cys Gly Leu Thr Leu Asp Lys Lys Thr Asp Tyr Val
115 120 125

Met Val Ala Leu Val Thr Asn Pro Pro Gln Val Thr Ser Tyr
130 135 140

<210> 149
<211> 679
<212> DNA
<213> Actinobacillus actinomycetemcomitans

<220>
<221> CDS
<222> (1)..(678)

<400> 149
cgc cga att att ggc aca acg aca aca gga tat tca cta atg cgc gca 48
Arg Arg Ile Ile Gly Thr Thr Thr Thr Gly Tyr Ser Leu Met Arg Ala
1 5 10 15
tta ttg cct ttt ctt cgt tta ttt aaa ttc gcc aaa ctg ccg tta att 96
Leu Leu Pro Phe Leu Arg Leu Phe Lys Phe Ala Lys Leu Pro Leu Ile
20 25 30
tta ggc ggc ttg ctg atg att tta ggg ctg gcg tcc agt atc ggg ttg 144
Leu Gly Gly Leu Leu Met Ile Leu Gly Leu Ala Ser Ser Ile Gly Leu
35 40 45
ctc acc ctt tcc ggc tgg ttt ctt gcc gcc acc gcc atc gcc ggt ttc 192
Leu Thr Leu Ser Gly Trp Phe Leu Ala Ala Thr Ala Ile Ala Gly Phe
50 55 60
ggc tcg cta ttt aac ttt ttc tac cca tcc gcc agc gta cgc ggt ttg 240
Gly Ser Leu Phe Asn Phe Phe Tyr Pro Ser Ala Ser Val Arg Gly Leu
65 70 75 80
gca atc ggc cgt acc gtg gcg cgc tac ctt gaa aaa gtg gtc acc cat 288
Ala Ile Gly Arg Thr Val Ala Arg Tyr Leu Glu Lys Val Val Thr His
85 90 95
gac gcc acc ttc cgc gta ttg gca aaa ctg cgt gtg cag gtg ttt gac 336
Asp Ala Thr Phe Arg Val Leu Ala Lys Leu Arg Val Gln Val Phe Asp
100 105 110
aaa atc att ccg tta agc cct gcg ctg ctc aac cgt tat cgt aac agc 384
Lys Ile Ile Pro Leu Ser Pro Ala Leu Leu Asn Arg Tyr Arg Asn Ser

| 115 | 120 | 125 | |
|---|-----|-----|-----|
| gat tta tta aac cgc ttg gtt gcc gat gtg gac acc ctc gac agc cta | | | 432 |
| Asp Leu Leu Asn Arg Leu Val Ala Asp Val Asp Thr Leu Asp Ser Leu | | | |
| 130 | 135 | 140 | |
| tat ctt cgc ctc att gcg ccc ttt atc agc gcc ata gtg gtg att gcg | | | 480 |
| Tyr Leu Arg Leu Ile Ala Pro Phe Ile Ser Ala Ile Val Val Ile Ala | | | |
| 145 | 150 | 155 | 160 |
| ttc att acc ttt ggc ttg agt ttt att aat gcc ccg ctc gcg ctg ttt | | | 528 |
| Phe Ile Thr Phe Gly Leu Ser Phe Ile Asn Ala Pro Leu Ala Leu Phe | | | |
| | 165 | 170 | 175 |
| atc ggt ttc aca tta ctg gcg ctc ttg ctg gtt atc ccg acg att ttt | | | 576 |
| Ile Gly Phe Thr Leu Leu Ala Leu Leu Leu Val Ile Pro Thr Ile Phe | | | |
| | 180 | 185 | 190 |
| tac cat ttg ggt aac aaa ttc ggc gcc aaa ctt acc caa tcc cgc gcc | | | 624 |
| Tyr His Leu Gly Asn Lys Phe Gly Ala Lys Leu Thr Gln Ser Arg Ala | | | |
| | 195 | 200 | 205 |
| ctt tac cgc acg caa ttt atc gaa ttt att cag gcg caa gcg gaa tta | | | 672 |
| Leu Tyr Arg Thr Gln Phe Ile Glu Phe Ile Gln Ala Gln Ala Glu Leu | | | |
| | 210 | 215 | 220 |
| ttg ctg t | | | 679 |
| Leu Leu | | | |
| 225 | | | |
| <210> 150 | | | |
| <211> 226 | | | |
| <212> PRT | | | |
| <213> Actinobacillus actinomycetemcomitans | | | |
| <400> 150 | | | |
| Arg Arg Ile Ile Gly Thr Thr Thr Thr Gly Tyr Ser Leu Met Arg Ala | | | |
| 1 | 5 | 10 | 15 |
| Leu Leu Pro Phe Leu Arg Leu Phe Lys Phe Ala Lys Leu Pro Leu Ile | | | |
| | 20 | 25 | 30 |
| Leu Gly Gly Leu Leu Met Ile Leu Gly Leu Ala Ser Ser Ile Gly Leu | | | |
| | 35 | 40 | 45 |
| Leu Thr Leu Ser Gly Trp Phe Leu Ala Ala Thr Ala Ile Ala Gly Phe | | | |
| | 50 | 55 | 60 |
| Gly Ser Leu Phe Asn Phe Phe Tyr Pro Ser Ala Ser Val Arg Gly Leu | | | |
| 65 | 70 | 75 | 80 |

Ala Ile Gly Arg Thr Val Ala Arg Tyr Leu Glu Lys Val Val Thr His
85 90 95

Asp Ala Thr Phe Arg Val Leu Ala Lys Leu Arg Val Gln Val Phe Asp
100 105 110

Lys Ile Ile Pro Leu Ser Pro Ala Leu Leu Asn Arg Tyr Arg Asn Ser
115 120 125

Asp Leu Leu Asn Arg Leu Val Ala Asp Val Asp Thr Leu Asp Ser Leu
130 135 140

Tyr Leu Arg Leu Ile Ala Pro Phe Ile Ser Ala Ile Val Val Ile Ala
145 150 155 160

Phe Ile Thr Phe Gly Leu Ser Phe Ile Asn Ala Pro Leu Ala Leu Phe
165 170 175

Ile Gly Phe Thr Leu Leu Ala Leu Leu Val Ile Pro Thr Ile Phe
180 185 190

Tyr His Leu Gly Asn Lys Phe Gly Ala Lys Leu Thr Gln Ser Arg Ala
195 200 205

Leu Tyr Arg Thr Gln Phe Ile Glu Phe Ile Gln Ala Gln Ala Glu Leu
210 215 220

Leu Leu
225

<210> 151
<211> 323
<212> DNA
<213> Actinobacillus actinomycetemcomitans

<220>
<221> CDS
<222> (1) .. (321)

<400> 151
cct tcc aaa ttg acg tta gct ctt gct att gca agt ggc tta agt gta 48
Pro Ser Lys Leu Thr Leu Ala Leu Ala Ile Ala Ser Gly Leu Ser Val
1 5 10 15

aca aat tta agc tat gcc act aac gat act att caa gcg ggc aac ggc 96
Thr Asn Leu Ser Tyr Ala Thr Asn Asp Thr Ile Gln Ala Gly Asn Gly

| 20 | 25 | 30 | |
|---|-----|----|-----|
| att gcc gtg gta caa acc caa tcg ggt gaa atc caa ggt tat att cat | | | 144 |
| Ile Ala Val Val Gln Thr Gln Ser Gly Glu Ile Gln Gly Tyr Ile His | | | |
| 35 | 40 | 45 | |
| aac gat att ttg acc tat aaa ggc att ccg tat gcc aca gca gaa cgt | | | 192 |
| Asn Asp Ile Leu Thr Tyr Lys Gly Ile Pro Tyr Ala Thr Ala Glu Arg | | | |
| 50 | 55 | 60 | |
| ttt atg cca cca aaa ccg gtg gag aat tgg caa ggg aca aaa atg gcg | | | 240 |
| Phe Met Pro Pro Lys Pro Val Glu Asn Trp Gln Gly Thr Lys Met Ala | | | |
| 65 | 70 | 75 | 80 |
| ttg act tat ggc gat gtc tgc ccg caa gtg ccg atg ggc ggt cgt agt | | | 288 |
| Leu Thr Tyr Gly Asp Val Cys Pro Gln Val Pro Met Gly Gly Arg Ser | | | |
| 85 | 90 | 95 | |
| ttc ttc ttt acc gga cct gaa atg acg gaa agt ga | | | 323 |
| Phe Phe Phe Thr Gly Pro Glu Met Thr Glu Ser | | | |
| 100 | 105 | | |
| <210> 152 | | | |
| <211> 107 | | | |
| <212> PRT | | | |
| <213> Actinobacillus actinomycetemcomitans | | | |
| <400> 152 | | | |
| Pro Ser Lys Leu Thr Leu Ala Leu Ala Ile Ala Ser Gly Leu Ser Val | | | |
| 1 | 5 | 10 | 15 |
| Thr Asn Leu Ser Tyr Ala Thr Asn Asp Thr Ile Gln Ala Gly Asn Gly | | | |
| 20 | 25 | 30 | |
| Ile Ala Val Val Gln Thr Gln Ser Gly Glu Ile Gln Gly Tyr Ile His | | | |
| 35 | 40 | 45 | |
| Asn Asp Ile Leu Thr Tyr Lys Gly Ile Pro Tyr Ala Thr Ala Glu Arg | | | |
| 50 | 55 | 60 | |
| Phe Met Pro Pro Lys Pro Val Glu Asn Trp Gln Gly Thr Lys Met Ala | | | |
| 65 | 70 | 75 | 80 |
| Leu Thr Tyr Gly Asp Val Cys Pro Gln Val Pro Met Gly Gly Arg Ser | | | |
| 85 | 90 | 95 | |
| Phe Phe Phe Thr Gly Pro Glu Met Thr Glu Ser | | | |
| 100 | 105 | | |

<210> 153
 <211> 177
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1)..(177)

<400> 153
 ggc ggc ggt gcc tgg gtt cag gcg gat ttg aag atg ttc caa atg cac 48
 Gly Gly Gly Ala Trp Val Gln Ala Asp Leu Lys Met Phe Gln Met His
 1 5 10 15
 agg atg tcg ttt ggt tca tcg gtg gcc gcg caa aat acc ttg aac gtg 96
 Arg Met Ser Phe Gly Ser Ser Val Ala Ala Gln Asn Thr Leu Asn Val
 20 25 30
 gtt gat att tac gcc gtg tca ctc aaa acc atc caa tgt cag ctg aaa 144
 Val Asp Ile Tyr Ala Val Ser Leu Lys Thr Ile Gln Cys Gln Leu Lys
 35 40 45
 gcc att gtg aca gat ttt gat att tcg cac ctt 177
 Ala Ile Val Thr Asp Phe Asp Ile Ser His Leu
 50 55

<210> 154
 <211> 59
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 154
 Gly Gly Gly Ala Trp Val Gln Ala Asp Leu Lys Met Phe Gln Met His
 1 5 10 15
 Arg Met Ser Phe Gly Ser Ser Val Ala Ala Gln Asn Thr Leu Asn Val
 20 25 30
 Val Asp Ile Tyr Ala Val Ser Leu Lys Thr Ile Gln Cys Gln Leu Lys
 35 40 45
 Ala Ile Val Thr Asp Phe Asp Ile Ser His Leu
 50 55

<210> 155
 <211> 469
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans
 <220>

<221> CDS
 <222> (1)..(468)

<400> 155

atg gag aaa aaa caa acc tca cgg gta caa aaa ctg gaa ttt ttg ctc 48
 Met Glu Lys Lys Gln Thr Ser Arg Val Gln Lys Leu Glu Phe Leu Leu
 1 5 10 15

aaa caa aca gat aaa atc cat ctg cgc gac gcg gca caa atg ctt gat 96
 Lys Gln Thr Asp Lys Ile His Leu Arg Asp Ala Ala Gln Met Leu Asp
 20 25 30

gtg tcg gaa atg act tta cgt cgg gat tta agt tcc gac agc ggc aat 144
 Val Ser Glu Met Thr Leu Arg Arg Asp Leu Ser Ser Asp Ser Gly Asn
 35 40 45

gtg gtg tta ttg ggc ggc tat atc gtg atg aac cca caa aaa agc ggc 192
 Val Val Leu Leu Gly Gly Tyr Ile Val Met Asn Pro Gln Lys Ser Gly
 50 55 60

aat cat tat cag att ttt gac caa caa acg cgc cac att acg gaa aaa 240
 Asn His Tyr Gln Ile Phe Asp Gln Gln Thr Arg His Ile Thr Glu Lys
 65 70 75 80

atg tgg ctc ggt aaa ctc gcc gcc aat ctc gtc aag gac gga gat acc 288
 Met Trp Leu Gly Lys Leu Ala Ala Asn Leu Val Lys Asp Gly Asp Thr
 85 90 95

gtg ttc ttc gat tgc ggt agc acc att ccg ttt atc att tcg caa atc 336
 Val Phe Phe Asp Cys Gly Ser Thr Ile Pro Phe Ile Ile Ser Gln Ile
 100 105 110

gat ccg cag ata aaa ttc acc gca ctt ttt tgc tcc atc aat agt ttt 384
 Asp Pro Gln Ile Lys Phe Thr Ala Leu Phe Cys Ser Ile Asn Ser Phe
 115 120 125

atg gcg ttg cag gac aaa ccg cac tgc gaa gtg att ctg tgc ggc gga 432
 Met Ala Leu Gln Asp Lys Pro His Cys Glu Val Ile Leu Cys Gly Gly
 130 135 140

cat tat tcg cgc cac aat tct ttc ctg act tcc gtg c 469
 His Tyr Ser Arg His Asn Ser Phe Leu Thr Ser Val
 145 150 155

<210> 156

<211> 156

<212> PRT

<213> Actinobacillus actinomycetemcomitans

<400> 156

Met Glu Lys Lys Gln Thr Ser Arg Val Gln Lys Leu Glu Phe Leu Leu
 1 5 10 15

Lys Gln Thr Asp Lys Ile His Leu Arg Asp Ala Ala Gln Met Leu Asp

20

25

30

Val Ser Glu Met Thr Leu Arg Arg Asp Leu Ser Ser Asp Ser Gly Asn
35 40 45

Val Val Leu Leu Gly Gly Tyr Ile Val Met Asn Pro Gln Lys Ser Gly
50 55 60

Asn His Tyr Gln Ile Phe Asp Gln Gln Thr Arg His Ile Thr Glu Lys
65 70 75 80

Met Trp Leu Gly Lys Leu Ala Ala Asn Leu Val Lys Asp Gly Asp Thr
85 90 95

Val Phe Phe Asp Cys Gly Ser Thr Ile Pro Phe Ile Ile Ser Gln Ile
100 105 110

Asp Pro Gln Ile Lys Phe Thr Ala Leu Phe Cys Ser Ile Asn Ser Phe
115 120 125

Met Ala Leu Gln Asp Lys Pro His Cys Glu Val Ile Leu Cys Gly Gly
130 135 140

His Tyr Ser Arg His Asn Ser Phe Leu Thr Ser Val
145 150 155

<210> 157

<211> 340

<212> DNA

<213> Actinobacillus actinomycetemcomitans

<220>

<221> CDS

<222> (1) .. (339)

<400> 157

atg aca tat cca ggt gga aaa ggt aaa tgt ttc caa aaa atc att aat 48
Met Thr Tyr Pro Gly Gly Lys Gly Lys Cys Phe Gln Lys Ile Ile Asn
1 5 10 15

tta atg cct ccg cat gac gta tat att gaa act cat ctt ggt agt ggt 96
Leu Met Pro Pro His Asp Val Tyr Ile Glu Thr His Leu Gly Ser Gly
20 25 30

gca gta cta cga aat aaa aaa cca gca cta aaa aat att gga ata gat 144
Ala Val Leu Arg Asn Lys Lys Pro Ala Leu Lys Asn Ile Gly Ile Asp
35 40 45

cta gat ttt gat gtt att caa tca tgg att ggt tat tct cct gaa aat 192
 Leu Asp Phe Asp Val Ile Gln Ser Trp Ile Gly Tyr Ser Pro Glu Asn
 50 55 60

cat aag ttt ttt aat aat gat gca ttg gcg ttt cta act aag tac ctg 240
 His Lys Phe Phe Asn Asn Asp Ala Leu Ala Phe Leu Thr Lys Tyr Leu
 65 70 75 80

ttt act ggg aaa gag tta gta tat tgt gat cct cca tat gtt ctt tca 288
 Phe Thr Gly Lys Glu Leu Val Tyr Cys Asp Pro Pro Tyr Val Leu Ser
 85 90 95

act aga aga aga caa aaa ata tat aaa tat gaa tac act gat gag cag 336
 Thr Arg Arg Arg Gln Lys Ile Tyr Lys Tyr Glu Tyr Thr Asp Glu Gln
 100 105 110

cat g 340
 His

<210> 158
 <211> 113
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 158

Met Thr Tyr Pro Gly Gly Lys Gly Lys Cys Phe Gln Lys Ile Ile Asn
 1 5 10 15

Leu Met Pro Pro His Asp Val Tyr Ile Glu Thr His Leu Gly Ser Gly
 20 25 30

Ala Val Leu Arg Asn Lys Lys Pro Ala Leu Lys Asn Ile Gly Ile Asp
 35 40 45

Leu Asp Phe Asp Val Ile Gln Ser Trp Ile Gly Tyr Ser Pro Glu Asn
 50 55 60

His Lys Phe Phe Asn Asn Asp Ala Leu Ala Phe Leu Thr Lys Tyr Leu
 65 70 75 80

Phe Thr Gly Lys Glu Leu Val Tyr Cys Asp Pro Pro Tyr Val Leu Ser
 85 90 95

Thr Arg Arg Arg Gln Lys Ile Tyr Lys Tyr Glu Tyr Thr Asp Glu Gln
 100 105 110

His

<210> 159
 <211> 771
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1) .. (771)

<400> 159
 atc gac gct ttt ttc tct cgc caa aac aat caa ttt cac ttg gaa caa 48
 Ile Asp Ala Phe Phe Ser Arg Gln Asn Asn Gln Phe His Leu Glu Gln
 1 5 10 15
 caa agc cat tgc gtt aac caa att atc gag caa tgg cgt tat aac ggg 96
 Gln Ser His Cys Val Asn Gln Ile Ile Glu Gln Trp Arg Tyr Asn Gly
 20 25 30
 caa att atc ggg cgt gaa att ccg caa ttt gtc gcc gaa cag aaa aac 144
 Gln Ile Ile Gly Arg Glu Ile Pro Gln Phe Val Ala Glu Gln Lys Asn
 35 40 45
 caa caa ggc ttg gca gtg cgt gtc acc tgc ccc gag caa acc tct ctt 192
 Gln Gln Gly Leu Ala Val Arg Val Thr Cys Pro Glu Gln Thr Ser Leu
 50 55 60
 tta gcg gaa ttt aac aat caa ccg gtg aac gat gcc ctt caa acg gca 240
 Leu Ala Glu Phe Asn Asn Gln Pro Val Asn Asp Ala Leu Gln Thr Ala
 65 70 75 80
 gaa aag tgc ggt gta tct ttt gag agt ttt cat att gtg gcg gaa gat 288
 Glu Lys Cys Gly Val Ser Phe Glu Ser Phe His Ile Val Ala Glu Asp
 85 90 95
 ctc aat tct gaa atc acc gcc acg gaa aca ccc gct tgg caa ctg ctc 336
 Leu Asn Ser Glu Ile Thr Ala Thr Glu Thr Pro Ala Trp Gln Leu Leu
 100 105 110
 tac acc acc tat ttg cag tct tgt tct ccc ctg caa agc ggt gaa tcc 384
 Tyr Thr Thr Tyr Leu Gln Ser Cys Ser Pro Leu Gln Ser Gly Glu Ser
 115 120 125
 ctg caa ccg att ccg ctg tat aaa caa ctg aaa aac ata ccg cac tta 432
 Leu Gln Pro Ile Pro Leu Tyr Lys Gln Leu Lys Asn Ile Pro His Leu
 130 135 140
 gca atg gat ttg gtt aaa tgg cag gaa aat tgg cag gcg tgc gat caa 480
 Ala Met Asp Leu Val Lys Trp Gln Glu Asn Trp Gln Ala Cys Asp Gln
 145 150 155 160
 ttg caa atg aac ggt tcc gtg ttg gaa caa cag gct ttg gtg caa att 528
 Leu Gln Met Asn Gly Ser Val Leu Glu Gln Gln Ala Leu Val Gln Ile
 165 170 175

| | |
|---|-----|
| tca gac acc caa agc acg ctg ttt aag cat ggt tac cat cta acg cag | 576 |
| Ser Asp Thr Gln Ser Thr Leu Phe Lys His Gly Tyr His Leu Thr Gln | |
| 180 185 190 | |

| | |
|---|-----|
| gaa att gag cga cac agc ggc att cct act tac tat tat tta tac cgc | 624 |
| Glu Ile Glu Arg His Ser Gly Ile Pro Thr Tyr Tyr Tyr Leu Tyr Arg | |
| 195 200 205 | |

| | |
|---|-----|
| atc ggt gga aaa agc tgt gaa gcg gag ctg caa tca cgc tgt ccg tta | 672 |
| Ile Gly Gly Lys Ser Cys Glu Ala Glu Leu Gln Ser Arg Cys Pro Leu | |
| 210 215 220 | |

| | |
|---|-----|
| tgt aaa aga aaa tgg acg tta agc cac ccg ctt ttt gac ttc tta tat | 720 |
| Cys Lys Arg Lys Trp Thr Leu Ser His Pro Leu Phe Asp Phe Leu Tyr | |
| 225 230 235 240 | |

| | |
|---|-----|
| ttt aaa tgt gat cat tgt cgc ctc gtt tca aac ctc tca tgg cat tgg | 768 |
| Phe Lys Cys Asp His Cys Arg Leu Val Ser Asn Leu Ser Trp His Trp | |
| 245 250 255 | |

| | |
|-----|-----|
| caa | 771 |
| Gln | |

<210> 160
 <211> 257
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 160

| |
|---|
| Ile Asp Ala Phe Phe Ser Arg Gln Asn Asn Gln Phe His Leu Glu Gln |
| 1 5 10 15 |

| |
|---|
| Gln Ser His Cys Val Asn Gln Ile Ile Glu Gln Trp Arg Tyr Asn Gly |
| 20 25 30 |

| |
|---|
| Gln Ile Ile Gly Arg Glu Ile Pro Gln Phe Val Ala Glu Gln Lys Asn |
| 35 40 45 |

| |
|---|
| Gln Gln Gly Leu Ala Val Arg Val Thr Cys Pro Glu Gln Thr Ser Leu |
| 50 55 60 |

| |
|---|
| Leu Ala Glu Phe Asn Asn Gln Pro Val Asn Asp Ala Leu Gln Thr Ala |
| 65 70 75 80 |

| |
|---|
| Glu Lys Cys Gly Val Ser Phe Glu Ser Phe His Ile Val Ala Glu Asp |
| 85 90 95 |

| |
|---|
| Leu Asn Ser Glu Ile Thr Ala Thr Glu Thr Pro Ala Trp Gln Leu Leu |
|---|

Tyr Thr Thr Tyr Leu Gln Ser Cys Ser Pro Leu Gln Ser Gly Glu Ser
115 120 125

Leu Gln Pro Ile Pro Leu Tyr Lys Gln Leu Lys Asn Ile Pro His Leu
130 135 140

Ala Met Asp Leu Val Lys Trp Gln Glu Asn Trp Gln Ala Cys Asp Gln
145 150 155 160

Leu Gln Met Asn Gly Ser Val Leu Glu Gln Gln Ala Leu Val Gln Ile
165 170 175

Ser Asp Thr Gln Ser Thr Leu Phe Lys His Gly Tyr His Leu Thr Gln
180 185 190

Glu Ile Glu Arg His Ser Gly Ile Pro Thr Tyr Tyr Tyr Leu Tyr Arg
195 200 205

Ile Gly Gly Lys Ser Cys Glu Ala Glu Leu Gln Ser Arg Cys Pro Leu
210 215 220

Cys Lys Arg Lys Trp Thr Leu Ser His Pro Leu Phe Asp Phe Leu Tyr
225 230 235 240

Phe Lys Cys Asp His Cys Arg Leu Val Ser Asn Leu Ser Trp His Trp
245 250 255

Gln

<210> 161
<211> 330
<212> DNA
<213> Actinobacillus actinomycetemcomitans

<220>
<221> CDS
<222> (1) .. (330)

<400> 161
gag gcg gat aaa ttt aaa gtg gat att ccg tct atg gca aga ctg aga
Glu Ala Asp Lys Phe Lys Val Asp Ile Pro Ser Met Ala Arg Leu Arg
1 5 10 15

atc agc ccg aat atc gac atc agt gcg aca ccg aag ctg ttg gaa ctt 96
 Ile Ser Pro Asn Ile Asp Ile Ser Ala Thr Pro Lys Leu Leu Glu Leu
 20 25 30

tcc ggc aat att gat att ccc tgg gcg cgc att gcc att gaa aac ctg 144
 Ser Gly Asn Ile Asp Ile Pro Trp Ala Arg Ile Ala Ile Glu Asn Leu
 35 40 45

ccg gac agt gca gtg gcg gtc agc tcc gat gaa gtg att tta aat ggc 192
 Pro Asp Ser Ala Val Ala Val Ser Ser Asp Glu Val Ile Leu Asn Gly
 50 55 60

aat aag aag agt act ctg ccg aaa aca ttg ccg agc gaa acc caa agc 240
 Asn Lys Lys Ser Thr Leu Pro Lys Thr Leu Pro Ser Glu Thr Gln Ser
 65 70 75 80

ggc atg gca att cgt tct gat tta aga atc aat atc ggc gat gat gtc 288
 Gly Met Ala Ile Arg Ser Asp Leu Arg Ile Asn Ile Gly Asp Asp Val
 85 90 95

agt tta aat gcc tat ggc ttg aaa acc cat ctc cac ggg ttg 330
 Ser Leu Asn Ala Tyr Gly Leu Lys Thr His Leu His Gly Leu
 100 105 110

<210> 162
 <211> 110
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 162

Glu Ala Asp Lys Phe Lys Val Asp Ile Pro Ser Met Ala Arg Leu Arg
 1 5 10 15

Ile Ser Pro Asn Ile Asp Ile Ser Ala Thr Pro Lys Leu Leu Glu Leu
 20 25 30

Ser Gly Asn Ile Asp Ile Pro Trp Ala Arg Ile Ala Ile Glu Asn Leu
 35 40 45

Pro Asp Ser Ala Val Ala Val Ser Ser Asp Glu Val Ile Leu Asn Gly
 50 55 60

Asn Lys Lys Ser Thr Leu Pro Lys Thr Leu Pro Ser Glu Thr Gln Ser
 65 70 75 80

Gly Met Ala Ile Arg Ser Asp Leu Arg Ile Asn Ile Gly Asp Asp Val
 85 90 95

Ser Leu Asn Ala Tyr Gly Leu Lys Thr His Leu His Gly Leu

100

105

110

<210> 163
 <211> 625
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1)..(624)

<400> 163

gat aag aca gaa acg atg caa caa aat gaa gaa aaa atc acg ccg tca 48
 Asp Lys Thr Glu Thr Met Gln Gln Asn Glu Glu Lys Ile Thr Pro Ser
 1 5 10 15

gag caa aaa ccg atc gtg cat gaa acc gtt gtg gtg aag aaa acc ggt 96
 Glu Gln Lys Pro Ile Val His Glu Thr Val Val Val Lys Lys Thr Gly
 20 25 30

tcc gcg tta ggt ttg ctg gca ctt tta att gcg ttg ggt tta ggc ggc 144
 Ser Ala Leu Gly Leu Leu Ala Leu Leu Ile Ala Leu Gly Leu Gly Gly
 35 40 45

gcg ggc tat tat ttc ggt cag cta cag gtt gac gaa ata cag caa aaa 192
 Ala Gly Tyr Tyr Phe Gly Gln Leu Gln Val Asp Glu Ile Gln Gln Lys
 50 55 60

ctg acc gca ctt gaa aac caa ttg caa caa aaa ggc act tcc gcc gat 240
 Leu Thr Ala Leu Glu Asn Gln Leu Gln Gln Lys Gly Thr Ser Ala Asp
 65 70 75 80

gtt gcc ggc atg ccg gat ttt agt gca gag aaa aat cag ctg gcg aaa 288
 Val Ala Gly Met Pro Asp Phe Ser Ala Glu Lys Asn Gln Leu Ala Lys
 85 90 95

tta acg gaa ttt tcc caa gtg gca agt gat caa atc agc gcc ttg aat 336
 Leu Thr Glu Phe Ser Gln Val Ala Ser Asp Gln Ile Ser Ala Leu Asn
 100 105 110

cag aat ttg tcc gcc aaa gaa caa agc ctg tcg gca ttg caa caa cag 384
 Gln Asn Leu Ser Ala Lys Glu Gln Ser Leu Ser Ala Leu Gln Gln Gln
 115 120 125

gtg caa cgt ttg tcc aat caa gcc aaa gcg gag cag ccg aat gac tgg 432
 Val Gln Arg Leu Ser Asn Gln Ala Lys Ala Glu Gln Pro Asn Asp Trp
 130 135 140

tta ctg acc gaa gcg gat ttt ctg tta aat aac gct ttg cgc aaa ctg 480
 Leu Leu Thr Glu Ala Asp Phe Leu Leu Asn Asn Ala Leu Arg Lys Leu
 145 150 155 160

gtg ttg gat aac gac gtg gat acc agt gtg tcc ttg ttg aaa gtt gcc 528
 Val Leu Asp Asn Asp Val Asp Thr Ser Val Ser Leu Leu Lys Val Ala
 165 170 175

gat gaa acc ctt tcc aaa gtc gcc atg cca caa gtg gcg cag gtg cgt 576
 Asp Glu Thr Leu Ser Lys Val Ala Met Pro Gln Val Ala Gln Val Arg
 180 185 190

agc gcc att aac gcc gat tta aaa cag ttg ttg tcc ctg aac aat gtg g 625
 Ser Ala Ile Asn Ala Asp Leu Lys Gln Leu Leu Ser Leu Asn Asn Val
 195 200 205

<210> 164
 <211> 208
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 164

Asp Lys Thr Glu Thr Met Gln Gln Asn Glu Glu Lys Ile Thr Pro Ser
 1 5 10 15

Glu Gln Lys Pro Ile Val His Glu Thr Val Val Val Lys Lys Thr Gly
 20 25 30

Ser Ala Leu Gly Leu Leu Ala Leu Leu Ile Ala Leu Gly Leu Gly Gly
 35 40 45

Ala Gly Tyr Tyr Phe Gly Gln Leu Gln Val Asp Glu Ile Gln Gln Lys
 50 55 60

Leu Thr Ala Leu Glu Asn Gln Leu Gln Gln Lys Gly Thr Ser Ala Asp
 65 70 75 80

Val Ala Gly Met Pro Asp Phe Ser Ala Glu Lys Asn Gln Leu Ala Lys
 85 90 95

Leu Thr Glu Phe Ser Gln Val Ala Ser Asp Gln Ile Ser Ala Leu Asn
 100 105 110

Gln Asn Leu Ser Ala Lys Glu Gln Ser Leu Ser Ala Leu Gln Gln Gln
 115 120 125

Val Gln Arg Leu Ser Asn Gln Ala Lys Ala Glu Gln Pro Asn Asp Trp
 130 135 140

Leu Leu Thr Glu Ala Asp Phe Leu Leu Asn Asn Ala Leu Arg Lys Leu
 145 150 155 160

Val Leu Asp Asn Asp Val Asp Thr Ser Val Ser Leu Leu Lys Val Ala

165

170

175

Asp Glu Thr Leu Ser Lys Val Ala Met Pro Gln Val Ala Gln Val Arg
 180 185 190

Ser Ala Ile Asn Ala Asp Leu Lys Gln Leu Leu Ser Leu Asn Asn Val
 195 200 205

<210> 165

<211> 684

<212> DNA

<213> Actinobacillus actinomycetemcomitans

<220>

<221> CDS

<222> (1)..(684)

<400> 165

atg acg att tta gtt ctg ggt atc aat cac aaa act gct tcc gtg gca 48
 Met Thr Ile Leu Val Leu Gly Ile Asn His Lys Thr Ala Ser Val Ala
 1 5 10 15

ttg cgg gaa aag gtg gcg ttt tcc gac gaa aag cgc act ttt gct ttg 96
 Leu Arg Glu Lys Val Ala Phe Ser Asp Glu Lys Arg Thr Phe Ala Leu
 20 25 30

cgt cac att caa caa acg cag ttg gcg gaa agt gcg gtg att tta tcc 144
 Arg His Ile Gln Gln Thr Gln Leu Ala Glu Ser Ala Val Ile Leu Ser
 35 40 45

acc tgt aat cgc acg gaa gtt tat ctg cac aat aaa agc gtt ccg ccg 192
 Thr Cys Asn Arg Thr Glu Val Tyr Leu His Asn Lys Ser Val Pro Pro
 50 55 60

caa gag acg caa acc tgg atc aca ctg gcg gtg cag tgg ttt gcc ggc 240
 Gln Glu Thr Gln Thr Trp Ile Thr Leu Ala Val Gln Trp Phe Ala Gly
 65 70 75 80

att cat caa cta gcg ttg gcg gag ctg cag cac tgt gtt tat act cac 288
 Ile His Gln Leu Ala Leu Ala Glu Leu Gln His Cys Val Tyr Thr His
 85 90 95

gaa aat ctt cag gcg gcg aat cat tta atg gaa gtg gcg tgc ggt ttg 336
 Glu Asn Leu Gln Ala Ala Asn His Leu Met Glu Val Ala Cys Gly Leu
 100 105 110

gat tcg ctg att tta ggc gaa ccg cag att ttg ggg cag gtg aag caa 384
 Asp Ser Leu Ile Leu Gly Glu Pro Gln Ile Leu Gly Gln Val Lys Gln
 115 120 125

gcc tac cac atg agc gag cag cat tat caa cag gaa ggg caa acc att 432
 Ala Tyr His Met Ser Glu Gln His Tyr Gln Gln Glu Gly Gln Thr Ile
 130 135 140

| | |
|---|-----|
| tcc ggc gaa cta tcc cgt tta ttc caa aaa acc ttt gct acc gct aaa | 480 |
| Ser Gly Glu Leu Ser Arg Leu Phe Gln Lys Thr Phe Ala Thr Ala Lys | |
| 145 150 155 160 | |

| | |
|---|-----|
| cgg gtg cgc acc gaa acc aac atc ggc gag agt gcg gtg tcc gtt gcc | 528 |
| Arg Val Arg Thr Glu Thr Asn Ile Gly Glu Ser Ala Val Ser Val Ala | |
| 165 170 175 | |

| | |
|---|-----|
| tat gcc gcc tgt agc cta gca cgt cag att ttt gaa tcc ctg cgt gac | 576 |
| Tyr Ala Ala Cys Ser Leu Ala Arg Gln Ile Phe Glu Ser Leu Arg Asp | |
| 180 185 190 | |

| | |
|---|-----|
| ttg acg att tta tta gtg ggc gca ggt gaa acc att gaa ctg gtg aac | 624 |
| Leu Thr Ile Leu Leu Val Gly Ala Gly Glu Thr Ile Glu Leu Val Asn | |
| 195 200 205 | |

| | |
|---|-----|
| cgc cat ttg tta cgt cac ggc gtg aaa aac tta ttt atc gcc aac cgt | 672 |
| Arg His Leu Leu Arg His Gly Val Lys Asn Leu Phe Ile Ala Asn Arg | |
| 210 215 220 | |

| | |
|-----------------|-----|
| aca ttg gcg cgc | 684 |
| Thr Leu Ala Arg | |
| 225 | |

<210> 166
 <211> 228
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans
 <400> 166

| |
|---|
| Met Thr Ile Leu Val Leu Gly Ile Asn His Lys Thr Ala Ser Val Ala |
| 1 5 10 15 |

| |
|---|
| Leu Arg Glu Lys Val Ala Phe Ser Asp Glu Lys Arg Thr Phe Ala Leu |
| 20 25 30 |

| |
|---|
| Arg His Ile Gln Gln Thr Gln Leu Ala Glu Ser Ala Val Ile Leu Ser |
| 35 40 45 |

| |
|---|
| Thr Cys Asn Arg Thr Glu Val Tyr Leu His Asn Lys Ser Val Pro Pro |
| 50 55 60 |

| |
|---|
| Gln Glu Thr Gln Thr Trp Ile Thr Leu Ala Val Gln Trp Phe Ala Gly |
| 65 70 75 80 |

| |
|---|
| Ile His Gln Leu Ala Leu Ala Glu Leu Gln His Cys Val Tyr Thr His |
| 85 90 95 |

| |
|---|
| Glu Asn Leu Gln Ala Ala Asn His Leu Met Glu Val Ala Cys Gly Leu |
|---|

100
 105
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 115
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 130
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 155
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 165
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 185
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 205
 210
 215
 220
 225

Asp Ser Leu Ile Leu Gly Glu Pro Gln Ile Leu Gly Gln Val Lys Gln
 115 120 125
 Ala Tyr His Met Ser Glu Gln His Tyr Gln Gln Glu Gly Gln Thr Ile
 130 135 140
 Ser Gly Glu Leu Ser Arg Leu Phe Gln Lys Thr Phe Ala Thr Ala Lys
 145 150 155 160
 Arg Val Arg Thr Glu Thr Asn Ile Gly Glu Ser Ala Val Ser Val Ala
 165 170 175
 Tyr Ala Ala Cys Ser Leu Ala Arg Gln Ile Phe Glu Ser Leu Arg Asp
 180 185 190
 Leu Thr Ile Leu Leu Val Gly Ala Gly Glu Thr Ile Glu Leu Val Asn
 195 200 205
 Arg His Leu Leu Arg His Gly Val Lys Asn Leu Phe Ile Ala Asn Arg
 210 215 220
 Thr Leu Ala Arg
 225

<210> 167
 <211> 138
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1)..(138)

<400> 167
 atg cgc cgt tgg aag ctg aaa atc ttc cgc aaa atg aac cgc act ttg 48
 Met Arg Arg Trp Lys Leu Lys Ile Phe Arg Lys Met Asn Arg Thr Leu
 1 5 10 15
 cgc gtt cgc ctt tcg ttc cca atg cac cga ttc gtg ccg gac ctt aat 96
 Arg Val Arg Leu Ser Phe Pro Met His Arg Phe Val Pro Asp Leu Asn
 20 25 30
 tta ttt aac ttc gat ctt tgt ata ttc cgt cgt tta att cgt 138
 Leu Phe Asn Phe Asp Leu Cys Ile Phe Arg Arg Leu Ile Arg
 35 40 45

<210> 168
 <211> 46
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 168

Met Arg Arg Trp Lys Leu Lys Ile Phe Arg Lys Met Asn Arg Thr Leu
 1 5 10 15

Arg Val Arg Leu Ser Phe Pro Met His Arg Phe Val Pro Asp Leu Asn
 20 25 30

Leu Phe Asn Phe Asp Leu Cys Ile Phe Arg Arg Leu Ile Arg
 35 40 45

<210> 169
 <211> 1950
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1) .. (1950)

<400> 169

atg gct gat gta tta acc cgt ttc aac agt ggc aag ctt tgg gaa ttc 48
 Met Ala Asp Val Leu Thr Arg Phe Asn Ser Gly Lys Leu Trp Glu Phe
 1 5 10 15

gat ggc ggc att cat ccg ccc gac atg aaa tcc caa tcc aac cgc gcg 96
 Asp Gly Gly Ile His Pro Pro Asp Met Lys Ser Gln Ser Asn Arg Ala
 20 25 30

cct att cgt acc ttg ccg ttg ccc gat aat ttc tac gtt ctt ctg aaa 144
 Pro Ile Arg Thr Leu Pro Leu Pro Asp Asn Phe Tyr Val Leu Leu Lys
 35 40 45

caa cac gcc ggc aca gcg ggc aat tta ttg gta aaa tgc ggc gat cat 192
 Gln His Ala Gly Thr Ala Gly Asn Leu Leu Val Lys Cys Gly Asp His
 50 55 60

gtt ttg aaa ggt caa ccg ctc acc cag ggg gac ggt ttg cgt tcg ctg 240
 Val Leu Lys Gly Gln Pro Leu Thr Gln Gly Asp Gly Leu Arg Ser Leu
 65 70 75 80

ccg gtt cat gcg cct act tca ggc acg gtc att gat gtg atg cct tat 288
 Pro Val His Ala Pro Thr Ser Gly Thr Val Ile Asp Val Met Pro Tyr
 85 90 95

gtc acc gcc cat cct tcc ggt cta ccg gaa acc tgt gtg cat att aaa 336
 Val Thr Ala His Pro Ser Gly Leu Pro Glu Thr Cys Val His Ile Lys
 100 105 110

| | |
|---|------|
| gcg gat gga tta gat caa tgg cgc gag caa acc ccg ttg gag gat ttc | 384 |
| Ala Asp Gly Leu Asp Gln Trp Arg Glu Gln Thr Pro Leu Glu Asp Phe | |
| 115 120 125 | |
| ctt agc caa acg ccg gaa cag tta atc gaa aaa att tat cag gcg ggc | 432 |
| Leu Ser Gln Thr Pro Glu Gln Leu Ile Glu Lys Ile Tyr Gln Ala Gly | |
| 130 135 140 | |
| att gcc ggt ctg ggt ggc gcg gta ttc ccg acc gcg gca aaa att cat | 480 |
| Ile Ala Gly Leu Gly Glu Ala Val Phe Pro Thr Ala Ala Lys Ile His | |
| 145 150 155 160 | |
| tcc gcc gag aaa cag gtg aaa tta ctg att att aac ggc gcg gaa tgt | 528 |
| Ser Ala Glu Lys Gln Val Lys Leu Leu Ile Ile Asn Gly Ala Glu Cys | |
| 165 170 175 | |
| gaa cct tac att acc tgc gac gat cgc tta atg cat gat tat gct gat | 576 |
| Glu Pro Tyr Ile Thr Cys Asp Asp Arg Leu Met His Asp Tyr Ala Asp | |
| 180 185 190 | |
| gaa att atc gaa ggc gtg cgt att ttg cgc tac att tta cgc cct gag | 624 |
| Glu Ile Ile Glu Gly Val Arg Ile Leu Arg Tyr Ile Leu Arg Pro Glu | |
| 195 200 205 | |
| aaa gtg gtg atc gcc gtt gaa gat aat aaa cca aaa gcg gtg aaa tcc | 672 |
| Lys Val Val Ile Ala Val Glu Asp Asn Lys Pro Lys Ala Val Lys Ser | |
| 210 215 220 | |
| ttg gaa cgc gcc tta cac ggc gcc aac gat att gaa atc cga gtg att | 720 |
| Leu Glu Arg Ala Leu His Gly Ala Asn Asp Ile Glu Ile Arg Val Ile | |
| 225 230 235 240 | |
| ccg acc aaa tac cct tcc ggc gcg gca aaa cag tta att caa gtg ctg | 768 |
| Pro Thr Lys Tyr Pro Ser Gly Ala Ala Lys Gln Leu Ile Gln Val Leu | |
| 245 250 255 | |
| acc ggc atg gag gta cct agc ggt caa cgc tcc tcc ggt atc ggc gtg | 816 |
| Thr Gly Met Glu Val Pro Ser Gly Gln Arg Ser Ser Gly Ile Gly Val | |
| 260 265 270 | |
| ctg atg caa aac atc ggc acc gct ttt gct att aaa cgc gca gtg atg | 864 |
| Leu Met Gln Asn Ile Gly Thr Ala Phe Ala Ile Lys Arg Ala Val Met | |
| 275 280 285 | |
| gat gat gaa ccg ctg att gag cgc gtc gtc acc ctc acc ggt gat aaa | 912 |
| Asp Asp Glu Pro Leu Ile Glu Arg Val Val Thr Leu Thr Gly Asp Lys | |
| 290 295 300 | |
| atc gcc gat aaa ggc aac tat tgg gcg cgt ttt gga acg ccg att tat | 960 |
| Ile Ala Asp Lys Gly Asn Tyr Trp Ala Arg Phe Gly Thr Pro Ile Tyr | |
| 305 310 315 320 | |
| cac ttg ttg cgc gaa acg ggc tat caa tac gac gat cgt ttc ccg gtc | 1008 |
| His Leu Leu Arg Glu Thr Gly Tyr Gln Tyr Asp Asp Arg Phe Pro Val | |
| 325 330 335 | |

| | |
|---|------|
| ttc atg ggc ggt ccg atg atg ggc ttt att ctg ccc gat tta aat gcg | 1056 |
| Phe Met Gly Gly Pro Met Met Gly Phe Ile Leu Pro Asp Leu Asn Ala | |
| 340 345 350 | |
| ccg atg acc aaa gtg acc aac tgc ctg ttg gcg ccg gat cat ttt gaa | 1104 |
| Pro Met Thr Lys Val Thr Asn Cys Leu Leu Ala Pro Asp His Phe Glu | |
| 355 360 365 | |
| tac gcc ccg ccg gaa gaa gaa aaa aat tgt att cgc tgt tct gcc tgt | 1152 |
| Tyr Ala Pro Pro Glu Glu Glu Lys Asn Cys Ile Arg Cys Ser Ala Cys | |
| 370 375 380 | |
| tcc gat gcc tgc ccg gtg aaa ctc atg ccg cag caa ttg tat tgg ttt | 1200 |
| Ser Asp Ala Cys Pro Val Lys Leu Met Pro Gln Gln Leu Tyr Trp Phe | |
| 385 390 395 400 | |
| gca cgc agc gaa gat cac gaa aaa tcg gaa gaa tat tcc ctc aaa gat | 1248 |
| Ala Arg Ser Glu Asp His Glu Lys Ser Glu Glu Tyr Ser Leu Lys Asp | |
| 405 410 415 | |
| tgt att gaa tgc ggc gtg tgc gct tat gtt tgc cca agt cac att ccg | 1296 |
| Cys Ile Glu Cys Gly Val Cys Ala Tyr Val Cys Pro Ser His Ile Pro | |
| 420 425 430 | |
| tta att caa tat ttc cgc cgg gaa aaa gct aaa atc tgg gaa atc aaa | 1344 |
| Leu Ile Gln Tyr Phe Arg Arg Glu Lys Ala Lys Ile Trp Glu Ile Lys | |
| 435 440 445 | |
| cac aaa gcc aaa ttg gcg gaa gaa gct aaa ata cgt ttt gaa caa cgc | 1392 |
| His Lys Ala Lys Leu Ala Glu Glu Ala Lys Ile Arg Phe Glu Gln Arg | |
| 450 455 460 | |
| caa gcc cgt ttg gaa cgg gaa gaa cag gaa cgc aaa gat cgc tca caa | 1440 |
| Gln Ala Arg Leu Glu Arg Glu Glu Gln Glu Arg Lys Asp Arg Ser Gln | |
| 465 470 475 480 | |
| cgt gct gca gcc gcc cgt cgt gaa gaa ttg gcg caa caa aaa ggc gtg | 1488 |
| Arg Ala Ala Ala Ala Arg Arg Glu Glu Leu Ala Gln Gln Lys Gly Val | |
| 485 490 495 | |
| gat ccg gtg gct gcc gcc tta gcg cgc tta aaa gcg aaa aaa gcc gaa | 1536 |
| Asp Pro Val Ala Ala Ala Leu Ala Arg Leu Lys Ala Lys Lys Ala Glu | |
| 500 505 510 | |
| acg acg gaa gct acg cag gca gaa cag aaa acc att gtt gac gaa aaa | 1584 |
| Thr Thr Glu Ala Thr Gln Ala Glu Gln Lys Thr Ile Val Asp Glu Lys | |
| 515 520 525 | |
| ggc cat atc ctg cct gac aac agc gac atc atg gca caa cgc aaa gcc | 1632 |
| Gly His Ile Leu Pro Asp Asn Ser Asp Ile Met Ala Gln Arg Lys Ala | |
| 530 535 540 | |
| cgt cgt tta gcc cgt cag gcg gaa gcg gca cac tcg ccg tcg cag aaa | 1680 |
| Arg Arg Leu Ala Arg Gln Ala Glu Ala Ala His Ser Pro Ser Gln Lys | |
| 545 550 555 560 | |
| aca gaa aaa acg cta gaa aaa acg cta gaa aaa acc acc gca ctt gag | 1728 |

Thr Glu Lys Thr Leu Glu Lys Thr Leu Glu Lys Thr Thr Ala Leu Glu
565 570 575

gat aaa aaa tct acc gtt gcc gcc gcc att gcc cgt gcg aaa gcc aag 1776
Asp Lys Lys Ser Thr Val Ala Ala Ala Ile Ala Arg Ala Lys Ala Lys
580 585 590

aaa gcg gcg cag caa acg gaa gcc gtc gaa gca aac gaa cct gaa acg 1824
Lys Ala Ala Gln Gln Thr Glu Ala Val Glu Ala Asn Glu Pro Glu Thr
595 600 605

gca aaa agt gcg gtc aat att tcc ggt gaa aat ggc gca gag aac gat 1872
Ala Lys Ser Ala Val Asn Ile Ser Gly Glu Asn Gly Ala Glu Asn Asp
610 615 620

ccg cgc aaa gcc gct gtt gcc gcc gct att gcc cgt gcg aaa gcg aag 1920
Pro Arg Lys Ala Ala Val Ala Ala Ala Ile Ala Arg Ala Lys Ala Lys
625 630 635 640

aaa gcc caa cgt gaa aac acg caa caa gat 1950
Lys Ala Gln Arg Glu Asn Thr Gln Gln Asp
645 650

<210> 170
<211> 650
<212> PRT
<213> Actinobacillus actinomycescomitans

<400> 170

Met Ala Asp Val Leu Thr Arg Phe Asn Ser Gly Lys Leu Trp Glu Phe
1 5 10 15

Asp Gly Gly Ile His Pro Pro Asp Met Lys Ser Gln Ser Asn Arg Ala
20 25 30

Pro Ile Arg Thr Leu Pro Leu Pro Asp Asn Phe Tyr Val Leu Leu Lys
35 40 45

Gln His Ala Gly Thr Ala Gly Asn Leu Leu Val Lys Cys Gly Asp His
50 55 60

Val Leu Lys Gly Gln Pro Leu Thr Gln Gly Asp Gly Leu Arg Ser Leu
65 70 75 80

Pro Val His Ala Pro Thr Ser Gly Thr Val Ile Asp Val Met Pro Tyr
85 90 95

Val Thr Ala His Pro Ser Gly Leu Pro Glu Thr Cys Val His Ile Lys
100 105 110

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| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| aaa | acc | gca | cag | gaa | tta | cgc | ggg | gac | ggc | gac | gcg | acc | gca | gcc | aaa | 480 |
| Lys | Thr | Ala | Gln | Glu | Leu | Arg | Gly | Asp | Gly | Asp | Ala | Thr | Ala | Ala | Lys | |
| 145 | | | | | 150 | | | | | 155 | | | | | 160 | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| atc | ttt | gcc | gat | gcc | ttt | ggg | aaa | gag | cct | gaa | ttt | tac | agc | ttc | att | 528 |
| Ile | Phe | Ala | Asp | Ala | Phe | Gly | Lys | Glu | Pro | Glu | Phe | Tyr | Ser | Phe | Ile | |
| | | | 165 | | | | | 170 | | | | | | 175 | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| cgt | agc | ctg | aaa | gcc | tat | gaa | agc | agc | ttc | gcc | gac | tcg | gac | aat | ttg | 576 |
| Arg | Ser | Leu | Lys | Ala | Tyr | Glu | Ser | Ser | Phe | Ala | Asp | Ser | Asp | Asn | Leu | |
| | | | 180 | | | | | 185 | | | | | 190 | | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| ttg | att | tta | aaa | ccg | gac | agt | gac | ttc | ttc | cgt | ttt | atg | caa | tca | cca | 624 |
| Leu | Ile | Leu | Lys | Pro | Asp | Ser | Asp | Phe | Phe | Arg | Phe | Met | Gln | Ser | Pro | |
| | | 195 | | | | | 200 | | | | | 205 | | | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|--|--|--|--|--|--|--|--|--|--|--|--|--|-----|
| agt | aaa | taa | | | | | | | | | | | | | | 633 |
| Ser | Lys | | | | | | | | | | | | | | | |
| | 210 | | | | | | | | | | | | | | | |

<210> 180
 <211> 210
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

 <400> 180

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Asp | Leu | Leu | Val | Asp | Ser | Tyr | Val | Lys | Trp | Arg | Ile | Asn | Asp | Leu | Gly |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Arg | Phe | Phe | Thr | Thr | Thr | Gly | Gly | Gly | Asp | Tyr | Ala | Gln | Ala | Ala | Asn |
| | | | 20 | | | | 25 | | | | | 30 | | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Leu | Leu | Arg | Arg | Lys | Val | Asn | Asp | Arg | Leu | Arg | Ser | Glu | Ile | Gly | Ser |
| | | 35 | | | | | 40 | | | | | 45 | | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Arg | Thr | Ile | Lys | Asp | Ile | Val | Ser | Gly | Thr | Arg | Gly | Glu | Leu | Met | Val |
| | 50 | | | | | 55 | | | | 60 | | | | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Gly | Thr | Lys | Lys | Ala | Leu | Asn | Ser | Gly | Gln | Asp | Ser | Thr | Ala | Glu | Leu |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|

65

70

75

80

Gly Ile Glu Val Leu Asp Val Arg Ile Lys Gln Ile Asn Leu Pro Asp
85 90 95

Glu Val Ser Ser Ser Ile Tyr Gln Arg Met Arg Ala Glu Arg Asp Ala
100 105 110

Val Ala Arg Glu His Arg Ser Gln Gly Lys Glu Lys Ala Ala Phe Ile
115 120 125

Gln Ala Asp Val Asp Arg Lys Val Thr Leu Ile Ile Ala Asn Ala Glu
130 135 140

Lys Thr Ala Gln Glu Leu Arg Gly Asp Gly Asp Ala Thr Ala Ala Lys
145 150 155 160

Ile Phe Ala Asp Ala Phe Gly Lys Glu Pro Glu Phe Tyr Ser Phe Ile
165 170 175

Arg Ser Leu Lys Ala Tyr Glu Ser Ser Phe Ala Asp Ser Asp Asn Leu
180 185 190

Leu Ile Leu Lys Pro Asp Ser Asp Phe Phe Arg Phe Met Gln Ser Pro
195 200 205

Ser Lys
210

<210> 181

<211> 582

<212> DNA

<213> Actinobacillus actinomycetemcomitans

<220>

<221> CDS

<222> (1) .. (582)

<400> 181

atg atc gac aac atc aac gaa ctt cgc acc ttt atc acc gcg gcg caa 48
Met Ile Asp Asn Ile Asn Glu Leu Arg Thr Phe Ile Thr Ala Ala Gln
1 5 10 15

gaa ggc agt ttc acc aaa gcc gcc gca aaa tta aac gtt tcc acc tcc 96
Glu Gly Ser Phe Thr Lys Ala Ala Ala Lys Leu Asn Val Ser Thr Ser
20 25 30

| | |
|---|-----|
| gca tta agc cat tcc att cgc aag ctg gaa gaa cag ctc aac atc aaa | 144 |
| Ala Leu Ser His Ser Ile Arg Lys Leu Glu Glu Gln Leu Asn Ile Lys | |
| 35 40 45 | |
| ctg ttc aac cgc acc aca cgc agc att gcc acc acg gag gcg ggc gag | 192 |
| Leu Phe Asn Arg Thr Thr Arg Ser Ile Ala Thr Thr Glu Ala Gly Glu | |
| 50 55 60 | |
| cag ttg ttt caa aat ctc ttg ccg ttg ttt gaa agt att gaa gat aat | 240 |
| Gln Leu Phe Gln Asn Leu Leu Pro Leu Phe Glu Ser Ile Glu Asp Asn | |
| 65 70 75 80 | |
| ctc aac gca tta agc acc ttt cgc aac acg ttg aaa ggg aaa tta tgc | 288 |
| Leu Asn Ala Leu Ser Thr Phe Arg Asn Thr Leu Lys Gly Lys Leu Cys | |
| 85 90 95 | |
| att aac ggt aac gat cat gtt ttt tta tcc att ttg tgg gat aaa ttg | 336 |
| Ile Asn Gly Asn Asp His Val Phe Leu Ser Ile Leu Trp Asp Lys Leu | |
| 100 105 110 | |
| atg gcg ttc gcg gaa caa tac ccc gaa atg gaa ttg gaa ttg acc agt | 384 |
| Met Ala Phe Ala Glu Gln Tyr Pro Glu Met Glu Leu Glu Leu Thr Ser | |
| 115 120 125 | |
| gac acc aaa ttt gtg gat atc gtg gcg ggg cgg ttt gat gcg ggt att | 432 |
| Asp Thr Lys Phe Val Asp Ile Val Ala Gly Arg Phe Asp Ala Gly Ile | |
| 130 135 140 | |
| cgc tta gga tcg gac gtg gca caa gat atg atc gcc gtg aga tta agc | 480 |
| Arg Leu Gly Ser Asp Val Ala Gln Asp Met Ile Ala Val Arg Leu Ser | |
| 145 150 155 160 | |
| gac aaa atg caa atg gcg gtg gtc ggc acg cca gag tat ttc gcc aaa | 528 |
| Asp Lys Met Gln Met Ala Val Val Gly Thr Pro Glu Tyr Phe Ala Lys | |
| 165 170 175 | |
| aaa gcc aca ccg aag aaa gta gaa gac ttg ggc gaa cac gag tgc ttg | 576 |
| Lys Ala Thr Pro Lys Lys Val Glu Asp Leu Gly Glu His Glu Cys Leu | |
| 180 185 190 | |
| ctg gtg | 582 |
| Leu Val | |

<210> 182
 <211> 194
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 182

| |
|---|
| Met Ile Asp Asn Ile Asn Glu Leu Arg Thr Phe Ile Thr Ala Ala Gln |
| 1 5 10 15 |

Glu Gly Ser Phe Thr Lys Ala Ala Ala Lys Leu Asn Val Ser Thr Ser

20

25

30

Ala Leu Ser His Ser Ile Arg Lys Leu Glu Glu Gln Leu Asn Ile Lys
 35 40 45

Leu Phe Asn Arg Thr Thr Arg Ser Ile Ala Thr Thr Glu Ala Gly Glu
 50 55 60

Gln Leu Phe Gln Asn Leu Leu Pro Leu Phe Glu Ser Ile Glu Asp Asn
 65 70 75 80

Leu Asn Ala Leu Ser Thr Phe Arg Asn Thr Leu Lys Gly Lys Leu Cys
 85 90 95

Ile Asn Gly Asn Asp His Val Phe Leu Ser Ile Leu Trp Asp Lys Leu
 100 105 110

Met Ala Phe Ala Glu Gln Tyr Pro Glu Met Glu Leu Glu Leu Thr Ser
 115 120 125

Asp Thr Lys Phe Val Asp Ile Val Ala Gly Arg Phe Asp Ala Gly Ile
 130 135 140

Arg Leu Gly Ser Asp Val Ala Gln Asp Met Ile Ala Val Arg Leu Ser
 145 150 155 160

Asp Lys Met Gln Met Ala Val Val Gly Thr Pro Glu Tyr Phe Ala Lys
 165 170 175

Lys Ala Thr Pro Lys Lys Val Glu Asp Leu Gly Glu His Glu Cys Leu
 180 185 190

Leu Val

<210> 183
 <211> 662
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1) .. (660)

<400> 183

| | |
|---|-----|
| taa tct cgg caa tgt tcg cca cct tgc ttt ttt tgc ctg cat tat ttc | 48 |
| Ser Arg Gln Cys Ser Pro Pro Cys Phe Phe Cys Leu His Tyr Phe | |
| 1 5 10 15 | |
| gcc gtt atc aaa aca aac cgc gca ccc cga acc caa aag tgc ggt gga | 96 |
| Ala Val Ile Lys Thr Asn Arg Ala Pro Arg Thr Gln Lys Cys Gly Gly | |
| 20 25 30 | |
| ttt tgg atg cgt ttt tta cgc atg ggc gtg gtt tca atc ctg tta ggg | 144 |
| Phe Trp Met Arg Phe Leu Arg Met Gly Val Val Ser Ile Leu Leu Gly | |
| 35 40 45 | |
| ggg att ttt atc gtc ggc ggt ttg tat cgt tcc gaa tgg cgt gat gat | 192 |
| Gly Ile Phe Ile Val Gly Gly Leu Tyr Arg Ser Glu Trp Arg Asp Asp | |
| 50 55 60 | |
| att cgt caa tgg gtt tct atg ccg cag gtg atg tta gac gag gcg aag | 240 |
| Ile Arg Gln Trp Val Ser Met Pro Gln Val Met Leu Asp Glu Ala Lys | |
| 65 70 75 | |
| caa atc gct gac ttg acc ggc gtg gat ttg ggc aac cgt tat ttc ctg | 288 |
| Gln Ile Ala Asp Leu Thr Gly Val Asp Leu Gly Asn Arg Tyr Phe Leu | |
| 80 85 90 95 | |
| gtg ctt gcc gac aac gac gat gcc tta ctg gaa aaa gaa cgg gcg ctg | 336 |
| Val Leu Ala Asp Asn Asp Asp Ala Leu Leu Glu Lys Glu Arg Ala Leu | |
| 100 105 110 | |
| aca aca aaa ctg gat gaa cag cac atc cct tat cgc gcc ctt tcc caa | 384 |
| Thr Thr Lys Leu Asp Glu Gln His Ile Pro Tyr Arg Ala Leu Ser Gln | |
| 115 120 125 | |
| tgg atg atg tcg gaa gcg caa cag cgg caa ttt ata gtg gaa ttg cag | 432 |
| Trp Met Met Ser Glu Ala Gln Gln Arg Gln Phe Ile Val Glu Leu Gln | |
| 130 135 140 | |
| gca aaa ctc aaa ccg cag gat tat gcc gta ttg gat gag att ggc gtg | 480 |
| Ala Lys Leu Lys Pro Gln Asp Tyr Ala Val Leu Asp Glu Ile Gly Val | |
| 145 150 155 | |
| ccg tcg gaa aga tta caa cag gca ctg cgg gaa ttg aac acg cag ccg | 528 |
| Pro Ser Glu Arg Leu Gln Gln Ala Leu Arg Glu Leu Asn Thr Gln Pro | |
| 160 165 170 175 | |
| ccg tta tcc ttg cag cag gcg ttg caa tct acc gtc ggg caa gca tgg | 576 |
| Pro Leu Ser Leu Gln Gln Ala Leu Gln Ser Thr Val Gly Gln Ala Trp | |
| 180 185 190 | |
| ctg ccg ctc tat tta ggc aaa tta gcg gaa aat cag gtg gct ggc atc | 624 |
| Leu Pro Leu Tyr Leu Gly Lys Leu Ala Glu Asn Gln Val Ala Gly Ile | |
| 195 200 205 | |
| gtg cag gta agc gga cac agt gcc gtt tcc ctt gcg ca | 662 |
| Val Gln Val Ser Gly His Ser Ala Val Ser Leu Ala | |
| 210 215 | |

<210> 184
 <211> 219
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 184 .

Ser Arg Gln Cys Ser Pro Pro Cys Phe Phe Cys Leu His Tyr Phe Ala
 1 5 10 15

Val Ile Lys Thr Asn Arg Ala Pro Arg Thr Gln Lys Cys Gly Gly Phe
 20 25 30

Trp Met Arg Phe Leu Arg Met Gly Val Val Ser Ile Leu Leu Gly Gly
 35 40 45

Ile Phe Ile Val Gly Gly Leu Tyr Arg Ser Glu Trp Arg Asp Asp Ile
 50 55 60

Arg Gln Trp Val Ser Met Pro Gln Val Met Leu Asp Glu Ala Lys Gln
 65 70 75 80

Ile Ala Asp Leu Thr Gly Val Asp Leu Gly Asn Arg Tyr Phe Leu Val
 85 90 95

Leu Ala Asp Asn Asp Asp Ala Leu Leu Glu Lys Glu Arg Ala Leu Thr
 100 105 110

Thr Lys Leu Asp Glu Gln His Ile Pro Tyr Arg Ala Leu Ser Gln Trp
 115 120 125

Met Met Ser Glu Ala Gln Gln Arg Gln Phe Ile Val Glu Leu Gln Ala
 130 135 140

Lys Leu Lys Pro Gln Asp Tyr Ala Val Leu Asp Glu Ile Gly Val Pro
 145 150 155 160

Ser Glu Arg Leu Gln Gln Ala Leu Arg Glu Leu Asn Thr Gln Pro Pro
 165 170 175

Leu Ser Leu Gln Gln Ala Leu Gln Ser Thr Val Gly Gln Ala Trp Leu
 180 185 190

Pro Leu Tyr Leu Gly Lys Leu Ala Glu Asn Gln Val Ala Gly Ile Val
 195 200 205

Gln Val Ser Gly His Ser Ala Val Ser Leu Ala
 210 215

<210> 185
 <211> 247
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1)..(246)

<400> 185
 ggg gtg ttt atg tcc gcg cat aat ttc ccg aaa tcc cgt gaa acc cgt 48
 Gly Val Phe Met Ser Ala His Asn Phe Pro Lys Ser Arg Glu Thr Arg
 1 5 10 15
 gca cct aaa gtg gcg gaa ttg gcg tta tat cgt gag cgg ctg ccg gaa 96
 Ala Pro Lys Val Ala Glu Leu Ala Leu Tyr Arg Glu Arg Leu Pro Glu
 20 25 30
 aaa tta agc tat ctg gct gac gca cca caa acg gat ccg gaa ggc agt 144
 Lys Leu Ser Tyr Leu Ala Asp Ala Pro Gln Thr Asp Pro Glu Gly Ser
 35 40 45
 gaa gcc atc att cgc ttt agt cgt aaa gaa aaa cgt caa tat gtc acc 192
 Glu Ala Ile Ile Arg Phe Ser Arg Lys Glu Lys Arg Gln Tyr Val Thr
 50 55 60
 tcc gaa aag aat ggc aag gcg aca aaa tgg ata gtg gat ttt gtt gat 240
 Ser Glu Lys Asn Gly Lys Ala Thr Lys Trp Ile Val Asp Phe Val Asp
 65 70 75 80
 ggg aag t 247
 Gly Lys

<210> 186
 <211> 82
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 186
 Gly Val Phe Met Ser Ala His Asn Phe Pro Lys Ser Arg Glu Thr Arg
 1 5 10 15
 Ala Pro Lys Val Ala Glu Leu Ala Leu Tyr Arg Glu Arg Leu Pro Glu
 20 25 30
 Lys Leu Ser Tyr Leu Ala Asp Ala Pro Gln Thr Asp Pro Glu Gly Ser

35

40

45

Glu Ala Ile Ile Arg Phe Ser Arg Lys Glu Lys Arg Gln Tyr Val Thr
50 55 60

Ser Glu Lys Asn Gly Lys Ala Thr Lys Trp Ile Val Asp Phe Val Asp
65 70 75 80

Gly Lys

<210> 187
<211> 357
<212> DNA
<213> Actinobacillus actinomycetemcomitans

<220>
<221> CDS
<222> (1)..(357)

<400> 187
tgc gtc cac tcc ggt cct ctc gta cta gga gca gcc cca acc aat tct 48
Cys Val His Ser Gly Pro Leu Val Leu Gly Ala Ala Pro Thr Asn Ser
1 5 10 15
cct acg ccc acg gca gat agg gac cga act gtc tca cga cgt tct aaa 96
Pro Thr Pro Thr Ala Asp Arg Asp Arg Thr Val Ser Arg Arg Ser Lys
20 25 30
ccc agc tcg cgt acc act tta aat ggc gaa cag cca tac cct tgg gac 144
Pro Ser Ser Arg Thr Thr Leu Asn Gly Glu Gln Pro Tyr Pro Trp Asp
35 40 45
cta ctt cag ccc cag gat gtg atg agc cga cat cga ggt gcc aaa cac 192
Leu Leu Gln Pro Gln Asp Val Met Ser Arg His Arg Gly Ala Lys His
50 55 60
cgc cgt cga tat gaa ctc ttg ggc ggt atc agc ctg tta tcc ccg gag 240
Arg Arg Arg Tyr Glu Leu Leu Gly Gly Ile Ser Leu Leu Ser Pro Glu
65 70 75 80
tac ctt tta tcc gtt gag cga tgg ccc ttc cat gca gaa cca ccg gat 288
Tyr Leu Leu Ser Val Glu Arg Trp Pro Phe His Ala Glu Pro Pro Asp
85 90 95
cac tat gac cta ctt tcg tac ctg ccc gac ctg tcc gtc tcg cag tta 336
His Tyr Asp Leu Leu Ser Tyr Leu Pro Asp Leu Ser Val Ser Gln Leu
100 105 110
agc ttg ctt ata cca ttg cac 357
Ser Leu Leu Ile Pro Leu His
115

<210> 188
 <211> 119
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 188

Cys Val His Ser Gly Pro Leu Val Leu Gly Ala Ala Pro Thr Asn Ser
 1 5 10 15

Pro Thr Pro Thr Ala Asp Arg Asp Arg Thr Val Ser Arg Arg Ser Lys
 20 25 30

Pro Ser Ser Arg Thr Thr Leu Asn Gly Glu Gln Pro Tyr Pro Trp Asp
 35 40 45

Leu Leu Gln Pro Gln Asp Val Met Ser Arg His Arg Gly Ala Lys His
 50 55 60

Arg Arg Arg Tyr Glu Leu Leu Gly Gly Ile Ser Leu Leu Ser Pro Glu
 65 70 75 80

Tyr Leu Leu Ser Val Glu Arg Trp Pro Phe His Ala Glu Pro Pro Asp
 85 90 95

His Tyr Asp Leu Leu Ser Tyr Leu Pro Asp Leu Ser Val Ser Gln Leu
 100 105 110

Ser Leu Leu Ile Pro Leu His
 115

<210> 189
 <211> 222
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1) .. (222)

<400> 189

gaa acc gtg tgc tat gaa atc atg cgc gaa atc att cgc gta cac cat 48
 Glu Thr Val Cys Tyr Glu Ile Met Arg Glu Ile Ile Arg Val His His
 1 5 10 15

gta ttt gcc agc gaa caa ttc gtg gtt tat gcc tct cac gcc gtc gcc 96
 Val Phe Ala Ser Glu Gln Phe Val Val Tyr Ala Ser His Ala Val Ala
 20 25 30

gat tat ctg att aac gaa gaa tcc cac ggc tta ctg gct gaa ctg gaa 144
 Asp Tyr Leu Ile Asn Glu Glu Ser His Gly Leu Leu Ala Glu Leu Glu
 35 40 45

gtg ttc atc ggc aaa caa atc caa gta aaa act gaa gtg ttt tat act 192
 Val Phe Ile Gly Lys Gln Ile Gln Val Lys Thr Glu Val Phe Tyr Thr
 50 55 60

cag gaa cag ttt gat gtg gtg gtg atg tag 222
 Gln Glu Gln Phe Asp Val Val Val Met
 65 70

<210> 190
 <211> 73
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 190

Glu Thr Val Cys Tyr Glu Ile Met Arg Glu Ile Ile Arg Val His His
 1 5 10 15

Val Phe Ala Ser Glu Gln Phe Val Val Tyr Ala Ser His Ala Val Ala
 20 25 30

Asp Tyr Leu Ile Asn Glu Glu Ser His Gly Leu Leu Ala Glu Leu Glu
 35 40 45

Val Phe Ile Gly Lys Gln Ile Gln Val Lys Thr Glu Val Phe Tyr Thr
 50 55 60

Gln Glu Gln Phe Asp Val Val Val Met
 65 70

<210> 191
 <211> 1670
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1) .. (1668)

<400> 191

atc gaa cgt tat caa cgt tat aac aac acc tca tac aat ctt gag ccg 48
 Ile Glu Arg Tyr Gln Arg Tyr Asn Asn Thr Ser Tyr Asn Leu Glu Pro
 1 5 10 15

gac atc aaa tac agt ccg ggc ggg ttg cgc gat ttg cat ttg ttg tat 96
 Asp Ile Lys Tyr Ser Pro Gly Gly Leu Arg Asp Leu His Leu Leu Tyr

| 20 | 25 | 30 | |
|---|----|----|-----|
| tgg atc gcg ttg cgc cat aac ggg gct aaa aat tta cag gaa att tta Trp Ile Ala Leu Arg His Asn Gly Ala Lys Asn Leu Gln Glu Ile Leu 35 40 45 | | | 144 |
| cag gcg ggg ttt att cat ccg gca gaa cac gcc ttg tta cta aaa agc Gln Ala Gly Phe Ile His Pro Ala Glu His Ala Leu Leu Leu Lys Ser 50 55 60 | | | 192 |
| cag caa ttt ctg ttt aaa gtg cgg tac gct ttg cac tta att tta aag Gln Gln Phe Leu Phe Lys Val Arg Tyr Ala Leu His Leu Ile Leu Lys 65 70 75 80 | | | 240 |
| cgt tat gac aac cgc ctg ttg ttt gat cgc caa ctg aaa gtc agc gaa Arg Tyr Asp Asn Arg Leu Leu Phe Asp Arg Gln Leu Lys Val Ser Glu 85 90 95 | | | 288 |
| ttg ttg ggt ttc cag ggg gaa ggc aat caa ggc gtg gaa gcc atg atg Leu Leu Gly Phe Gln Gly Glu Gly Asn Gln Gly Val Glu Ala Met Met 100 105 110 | | | 336 |
| aag cgc ttt ttt cag gcg ttg cat tcc att tcg tta cta agc gaa ttg Lys Arg Phe Phe Gln Ala Leu His Ser Ile Ser Leu Leu Ser Glu Leu 115 120 125 | | | 384 |
| ttg gta aaa cat tat cag gaa cat ttt tta acc cgt cat gca gtg gtg Leu Val Lys His Tyr Gln Glu His Phe Leu Thr Arg His Ala Val Val 130 135 140 | | | 432 |
| agc gag caa ata ctc gat gac aat ttc agc ctg atc aat caa tcc att Ser Glu Gln Ile Leu Asp Asp Asn Phe Ser Leu Ile Asn Gln Ser Ile 145 150 155 160 | | | 480 |
| tgc tta cgt aat cat caa tgc ttt gag cag cag ccg gaa agc att ctt Cys Leu Arg Asn His Gln Cys Phe Glu Gln Gln Pro Glu Ser Ile Leu 165 170 175 | | | 528 |
| gac ctt ttt tat cat tta acc caa tat ccg cag gcg gaa att cat tcc Asp Leu Phe Tyr His Leu Thr Gln Tyr Pro Gln Ala Glu Ile His Ser 180 185 190 | | | 576 |
| ttt gtc ttg cgc gag ctt tat ttg gcg ctg gag caa cgg cag ggc tat Phe Val Leu Arg Glu Leu Tyr Leu Ala Leu Glu Gln Arg Gln Gly Tyr 195 200 205 | | | 624 |
| ttg tgt gat ttg cca gcg gcg cgg gaa aaa ttc gtg cgc ctg ttt aat Leu Cys Asp Leu Pro Ala Ala Arg Glu Lys Phe Val Arg Leu Phe Asn 210 215 220 | | | 672 |
| cag ccg aat gcg att aaa cgt gct ttt ttc cct atg cac caa tac ggc Gln Pro Asn Ala Ile Lys Arg Ala Phe Phe Pro Met His Gln Tyr Gly 225 230 235 240 | | | 720 |
| gtg ctt acc gcc tat tta ccg caa tgg ggc aac gtc gtc ggt tta atg Val Leu Thr Ala Tyr Leu Pro Gln Trp Gly Asn Val Val Gly Leu Met 245 250 255 | | | 768 |

| | |
|---|------|
| cag ttt gat tta ttt cat tgt tac acc gtg gac gag cat att ctg cgc | 816 |
| Gln Phe Asp Leu Phe His Cys Tyr Thr Val Asp Glu His Ile Leu Arg | |
| 260 265 270 | |
| gtg atg tta aaa ctg gaa agt ttt tta gag ggc gct tcg gca caa agc | 864 |
| Val Met Leu Lys Leu Glu Ser Phe Leu Glu Gly Ala Ser Ala Gln Ser | |
| 275 280 285 | |
| cat ccc att tgc cat caa ata ttc agc cga att tcc gac cgc act ttg | 912 |
| His Pro Ile Cys His Gln Ile Phe Ser Arg Ile Ser Asp Arg Thr Leu | |
| 290 295 300 | |
| ttg tat att gcc gct tta ttt cac gac atc gcc aaa ggg cgc ggc ggt | 960 |
| Leu Tyr Ile Ala Ala Leu Phe His Asp Ile Ala Lys Gly Arg Gly Gly | |
| 305 310 315 320 | |
| tct cat gaa tta ttg ggt gcg gtg gat gtg cgc gaa ttt gcc gtt cgg | 1008 |
| Ser His Glu Leu Leu Gly Ala Val Asp Val Arg Glu Phe Ala Val Arg | |
| 325 330 335 | |
| cac ggt ttt gat caa cgg gaa acg gaa acc atg gtg tgg ctg gtg gag | 1056 |
| His Gly Phe Asp Gln Arg Glu Thr Glu Thr Met Val Trp Leu Val Glu | |
| 340 345 350 | |
| cag cat ttg ctt atg tcg gtc acg gca caa cgg cgg gat att cat gat | 1104 |
| Gln His Leu Leu Met Ser Val Thr Ala Gln Arg Arg Asp Ile His Asp | |
| 355 360 365 | |
| ccg gaa att gta ctg aat ttc gcc gaa ctg gtg cgt aat cag gtg cgt | 1152 |
| Pro Glu Ile Val Leu Asn Phe Ala Glu Leu Val Arg Asn Gln Val Arg | |
| 370 375 380 | |
| ttg gat tat tta acc tgc ctg acc gtc gcc gat att gtg gcg acc aat | 1200 |
| Leu Asp Tyr Leu Thr Cys Leu Thr Val Ala Asp Ile Val Ala Thr Asn | |
| 385 390 395 400 | |
| gaa act ttg tgg aat agc tgg aag cgt tct ttg ctg gcg act ttg tac | 1248 |
| Glu Thr Leu Trp Asn Ser Trp Lys Arg Ser Leu Leu Ala Thr Leu Tyr | |
| 405 410 415 | |
| gat tac gcc acc caa caa ttc gcc caa ggg ctg gaa agt atc ttg gat | 1296 |
| Asp Tyr Ala Thr Gln Gln Phe Ala Gln Gly Leu Glu Ser Ile Leu Asp | |
| 420 425 430 | |
| aat caa gcg aaa gcg aaa gga cac cgc cga tta gca ctg cag gaa ata | 1344 |
| Asn Gln Ala Lys Ala Lys Gly His Arg Arg Leu Ala Leu Gln Glu Ile | |
| 435 440 445 | |
| cgt gaa aaa acc acc gca ctt tcc gac aaa cac atc gaa aaa ttg tgg | 1392 |
| Arg Glu Lys Thr Thr Ala Leu Ser Asp Lys His Ile Glu Lys Leu Trp | |
| 450 455 460 | |
| cag cgt ttt ccg ata gat tat ttc ttg cgc aat tcg cca caa caa att | 1440 |
| Gln Arg Phe Pro Ile Asp Tyr Phe Leu Arg Asn Ser Pro Gln Gln Ile | |
| 465 470 475 480 | |

ggt tgg cat acc cgt ttg ctt gcc gaa ttt gaa ggg gaa ttg ttg gtg 1488
 Gly Trp His Thr Arg Leu Leu Ala Glu Phe Glu Gly Glu Leu Leu Val
 485 490 495

aaa gtc agt aac cgg ttt tct gcc ggc ggc acg gaa att ttc att tat 1536
 Lys Val Ser Asn Arg Phe Ser Ala Gly Gly Thr Glu Ile Phe Ile Tyr
 500 505 510

acc aaa gac cga ccg aac ctg ttt cac aaa gtg gta agt act atc ggc 1584
 Thr Lys Asp Arg Pro Asn Leu Phe His Lys Val Val Ser Thr Ile Gly
 515 520 525

gcg aaa aaa ctc agt atc cat gat gcg caa att atc acc gcc aaa gac 1632
 Ala Lys Lys Leu Ser Ile His Asp Ala Gln Ile Ile Thr Ala Lys Asp
 530 535 540

ggc tat gtg ttg gac agt ttt att gtg acg gaa tta ga 1670
 Gly Tyr Val Leu Asp Ser Phe Ile Val Thr Glu Leu
 545 550 555

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Asp Ile Lys Tyr Ser Pro Gly Gly Leu Arg Asp Leu His Leu Leu Tyr
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Trp Ile Ala Leu Arg His Asn Gly Ala Lys Asn Leu Gln Glu Ile Leu
 35 40 45

Gln Ala Gly Phe Ile His Pro Ala Glu His Ala Leu Leu Leu Lys Ser
 50 55 60

Gln Gln Phe Leu Phe Lys Val Arg Tyr Ala Leu His Leu Ile Leu Lys
 65 70 75 80

Arg Tyr Asp Asn Arg Leu Leu Phe Asp Arg Gln Leu Lys Val Ser Glu
 85 90 95

Leu Leu Gly Phe Gln Gly Glu Gly Asn Gln Gly Val Glu Ala Met Met
 100 105 110

Lys Arg Phe Phe Gln Ala Leu His Ser Ile Ser Leu Leu Ser Glu Leu

115

120

125

Leu Val Lys His Tyr Gln Glu His Phe Leu Thr Arg His Ala Val Val
130 135 140

Ser Glu Gln Ile Leu Asp Asp Asn Phe Ser Leu Ile Asn Gln Ser Ile
145 150 155 160

Cys Leu Arg Asn His Gln Cys Phe Glu Gln Gln Pro Glu Ser Ile Leu
165 170 175

Asp Leu Phe Tyr His Leu Thr Gln Tyr Pro Gln Ala Glu Ile His Ser
180 185 190

Phe Val Leu Arg Glu Leu Tyr Leu Ala Leu Glu Gln Arg Gln Gly Tyr
195 200 205

Leu Cys Asp Leu Pro Ala Ala Arg Glu Lys Phe Val Arg Leu Phe Asn
210 215 220

Gln Pro Asn Ala Ile Lys Arg Ala Phe Phe Pro Met His Gln Tyr Gly
225 230 235 240

Val Leu Thr Ala Tyr Leu Pro Gln Trp Gly Asn Val Val Gly Leu Met
245 250 255

Gln Phe Asp Leu Phe His Cys Tyr Thr Val Asp Glu His Ile Leu Arg
260 265 270

Val Met Leu Lys Leu Glu Ser Phe Leu Glu Gly Ala Ser Ala Gln Ser
275 280 285

His Pro Ile Cys His Gln Ile Phe Ser Arg Ile Ser Asp Arg Thr Leu
290 295 300

Leu Tyr Ile Ala Ala Leu Phe His Asp Ile Ala Lys Gly Arg Gly Gly
305 310 315 320

Ser His Glu Leu Leu Gly Ala Val Asp Val Arg Glu Phe Ala Val Arg
325 330 335

His Gly Phe Asp Gln Arg Glu Thr Glu Thr Met Val Trp Leu Val Glu
340 345 350

Gln His Leu Leu Met Ser Val Thr Ala Gln Arg Arg Asp Ile His Asp
 355 360 365

Pro Glu Ile Val Leu Asn Phe Ala Glu Leu Val Arg Asn Gln Val Arg
 370 375 380

Leu Asp Tyr Leu Thr Cys Leu Thr Val Ala Asp Ile Val Ala Thr Asn
 385 390 395 400

Glu Thr Leu Trp Asn Ser Trp Lys Arg Ser Leu Leu Ala Thr Leu Tyr
 405 410 415

Asp Tyr Ala Thr Gln Gln Phe Ala Gln Gly Leu Glu Ser Ile Leu Asp
 420 425 430

Asn Gln Ala Lys Ala Lys Gly His Arg Arg Leu Ala Leu Gln Glu Ile
 435 440 445

Arg Glu Lys Thr Thr Ala Leu Ser Asp Lys His Ile Glu Lys Leu Trp
 450 455 460

Gln Arg Phe Pro Ile Asp Tyr Phe Leu Arg Asn Ser Pro Gln Gln Ile
 465 470 475 480

Gly Trp His Thr Arg Leu Leu Ala Glu Phe Glu Gly Glu Leu Leu Val
 485 490 495

Lys Val Ser Asn Arg Phe Ser Ala Gly Gly Thr Glu Ile Phe Ile Tyr
 500 505 510

Thr Lys Asp Arg Pro Asn Leu Phe His Lys Val Val Ser Thr Ile Gly
 515 520 525

Ala Lys Lys Leu Ser Ile His Asp Ala Gln Ile Ile Thr Ala Lys Asp
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Gly Tyr Val Leu Asp Ser Phe Ile Val Thr Glu Leu
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| gtc | aac | cat | tcg | ctt | tat | tcc | gta | ttg | aga | ccg | att | aat | ggc | gaa | agc | 48 |
| Val | Asn | His | Ser | Leu | Tyr | Ser | Val | Leu | Arg | Pro | Ile | Asn | Gly | Glu | Ser | |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|
| acc | ctt | att | aaa | ggg | caa | gcg | aag | tgg | gtg | att | tca | aga | ggg | tcg | cgt | 96 |
| Thr | Leu | Ile | Lys | Gly | Gln | Ala | Lys | Trp | Val | Ile | Ser | Arg | Gly | Ser | Arg | |
| | | | 20 | | | | | 25 | | | | | 30 | | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| aat | cgc | act | ttt | cgt | gtc | ggg | caa | tct | tat | tgt | cct | tgt | tgt | tta | ggg | 144 |
| Asn | Arg | Thr | Phe | Arg | Val | Gly | Gln | Ser | Tyr | Cys | Pro | Cys | Cys | Leu | Gly | |
| | | 35 | | | | | 40 | | | | | 45 | | | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| gaa | aca | cct | tat | ttg | cgt | aat | gaa | tgg | cgt | ttt | gcg | tgg | cat | ttt | ggg | 192 |
| Glu | Thr | Pro | Tyr | Leu | Arg | Asn | Glu | Trp | Arg | Phe | Ala | Trp | His | Phe | Gly | |
| | 50 | | | | | 55 | | | | | 60 | | | | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| tgt | tcg | aaa | cat | caa | gtt | tta | ctt | gaa | tct | aaa | tgc | cct | tgt | tgt | ggc | 240 |
| Cys | Ser | Lys | His | Gln | Val | Leu | Leu | Glu | Ser | Lys | Cys | Pro | Cys | Cys | Gly | |
| 65 | | | | 70 | | | | | 75 | | | | | | 80 | |

| | | | | | | | | | | | | | | | | |
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| gaa | ctg | tat | caa | cct | cat | ttg | ctt | tcc | gca | gaa | aaa | cga | cac | tta | aat | 288 |
| Glu | Leu | Tyr | Gln | Pro | His | Leu | Leu | Ser | Ala | Glu | Lys | Arg | His | Leu | Asn | |
| | | | 85 | | | | | 90 | | | | | | 95 | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| tac | tgt | cat | caa | tgt | ggg | gag | aaa | tta | cag | gtt | gtt | aca | aca | ccg | ctt | 336 |
| Tyr | Cys | His | Gln | Cys | Gly | Glu | Lys | Leu | Gln | Val | Val | Thr | Thr | Pro | Leu | |
| | | | 100 | | | | | 105 | | | | | 110 | | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| aat | gaa | gta | gaa | att | gca | aca | atg | gaa | aca | ctt | aat | aac | gta | ttt | atg | 384 |
| Asn | Glu | Val | Glu | Ile | Ala | Thr | Met | Glu | Thr | Leu | Asn | Asn | Val | Phe | Met | |
| | | 115 | | | | | 120 | | | | | 125 | | | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| act | aac | tca | ggg | gaa | tgt | ttc | agg | aaa | cgt | gtg | aat | gca | caa | gtg | tac | 432 |
| Thr | Asn | Ser | Gly | Glu | Cys | Phe | Arg | Lys | Arg | Val | Asn | Ala | Gln | Val | Tyr | |
| | 130 | | | | | 135 | | | | | 140 | | | | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| ttt | gct | ata | ttg | cgt | tac | ttc | atc | aat | ctt | att | cgg | cgt | gct | acg | gtc | 480 |
| Phe | Ala | Ile | Leu | Arg | Tyr | Phe | Ile | Asn | Leu | Ile | Arg | Arg | Ala | Thr | Val | |
| 145 | | | | 150 | | | | | 155 | | | | | | 160 | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| gta | aaa | tct | act | cac | gct | ttt | gca | aaa | ttt | gtg | gaa | gaa | tgt | ggg | att | 528 |
| Val | Lys | Ser | Thr | His | Ala | Phe | Ala | Lys | Phe | Val | Glu | Glu | Cys | Gly | Ile | |
| | | | | 165 | | | | 170 | | | | | | 175 | | |

| | | | | | | | | | | | | | | | | |
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| tct | caa | gcg | gaa | ata | tgc | caa | acc | aaa | acc | gcc | ctt | gca | | | | 567 |
| Ser | Gln | Ala | Glu | Ile | Cys | Gln | Thr | Lys | Thr | Ala | Leu | Ala | | | | |
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Thr Leu Ile Lys Gly Gln Ala Lys Trp Val Ile Ser Arg Gly Ser Arg
 20 25 30

Asn Arg Thr Phe Arg Val Gly Gln Ser Tyr Cys Pro Cys Cys Leu Gly
 35 40 45

Glu Thr Pro Tyr Leu Arg Asn Glu Trp Arg Phe Ala Trp His Phe Gly
 50 55 60

Cys Ser Lys His Gln Val Leu Leu Glu Ser Lys Cys Pro Cys Cys Gly
 65 70 75 80

Glu Leu Tyr Gln Pro His Leu Leu Ser Ala Glu Lys Arg His Leu Asn
 85 90 95

Tyr Cys His Gln Cys Gly Glu Lys Leu Gln Val Val Thr Thr Pro Leu
 100 105 110

Asn Glu Val Glu Ile Ala Thr Met Glu Thr Leu Asn Asn Val Phe Met
 115 120 125

Thr Asn Ser Gly Glu Cys Phe Arg Lys Arg Val Asn Ala Gln Val Tyr
 130 135 140

Phe Ala Ile Leu Arg Tyr Phe Ile Asn Leu Ile Arg Arg Ala Thr Val
 145 150 155 160

Val Lys Ser Thr His Ala Phe Ala Lys Phe Val Glu Glu Cys Gly Ile
 165 170 175

Ser Gln Ala Glu Ile Cys Gln Thr Lys Thr Ala Leu Ala
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<400> 195

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| acc | ttg | gat | gtg | ctt | cgt | tcc | gaa | act | ttc | gtt | tcc | gaa | tta | aaa | ggc | 48 |
| Thr | Leu | Asp | Val | Leu | Arg | Ser | Glu | Thr | Phe | Val | Ser | Glu | Leu | Lys | Gly | |
| 1 | | | 5 | | | | | 10 | | | | | | 15 | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|
| tta | aat | gct | tat | cgc | acc | acc | gtg | cct | gtc | atc | ggc | gga | cac | tcc | ggg | 96 |
| Leu | Asn | Ala | Tyr | Arg | Thr | Thr | Val | Pro | Val | Ile | Gly | Gly | His | Ser | Gly | |
| | | 20 | | | | | 25 | | | | | | 30 | | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| gtg | act | att | ctt | ccg | tta | tta | tct | caa | gtg | caa | tac | gtt | gaa | tgg | aaa | 144 |
| Val | Thr | Ile | Leu | Pro | Leu | Leu | Ser | Gln | Val | Gln | Tyr | Val | Glu | Trp | Lys | |
| | | 35 | | | | | 40 | | | | | 45 | | | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| gag | gac | gaa | att | gaa | ccg | tta | acc | aaa | cgc | att | caa | aat | gcc | ggc | acc | 192 |
| Glu | Asp | Glu | Ile | Glu | Pro | Leu | Thr | Lys | Arg | Ile | Gln | Asn | Ala | Gly | Thr | |
| | 50 | | | | | 55 | | | | | 60 | | | | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| gaa | gta | gta | aac | gcg | aaa | gcc | ggc | ggc | ggg | tcc | gca | acc | tta | tcc | atg | 240 |
| Glu | Val | Val | Asn | Ala | Lys | Ala | Gly | Gly | Gly | Ser | Ala | Thr | Leu | Ser | Met | |
| 65 | | | | | 70 | | | | | 75 | | | | | 80 | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| gcg | cag | gcg | gca | gcc | cgt | ttt | gct | aat | gct | gta | gtc | cgc | ggg | tta | caa | 288 |
| Ala | Gln | Ala | Ala | Ala | Arg | Phe | Ala | Asn | Ala | Val | Val | Arg | Gly | Leu | Gln | |
| | | | 85 | | | | | 90 | | | | | | 95 | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| ggg | gaa | acc | gtc | gta | gaa | tgc | agc | tat | gtg | gaa | ggc | gac | ggc | aaa | tac | 336 |
| Gly | Glu | Thr | Val | Val | Glu | Cys | Ser | Tyr | Val | Glu | Gly | Asp | Gly | Lys | Tyr | |
| | | | 100 | | | | | 105 | | | | | 110 | | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| gcc | cgc | ttc | ttc | gca | caa | ccg | gtt | cgc | ttc | ggc | aag | gaa | ggg | gtg | gaa | 384 |
| Ala | Arg | Phe | Phe | Ala | Gln | Pro | Val | Arg | Phe | Gly | Lys | Glu | Gly | Val | Glu | |
| | | 115 | | | | | 120 | | | | | 125 | | | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| gaa | atc | cta | cca | atc | ggg | aaa | ctc | agc | gcc | ttg | gaa | caa | cag | gct | tta | 432 |
| Glu | Ile | Leu | Pro | Ile | Gly | Lys | Leu | Ser | Ala | Leu | Glu | Gln | Gln | Ala | Leu | |
| | 130 | | | | | 135 | | | | | 140 | | | | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| gaa | acc | atg | tta | ccg | aca | ttg | cgt | gca | gat | att | gaa | tta | ggg | gag | aag | 480 |
| Glu | Thr | Met | Leu | Pro | Thr | Leu | Arg | Ala | Asp | Ile | Glu | Leu | Gly | Glu | Lys | |
| 145 | | | | | 150 | | | | | 155 | | | | | 160 | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|--|--|--|--|--|--|--|--|--|--|--|--|-----|
| ttt | att | aat | cca | | | | | | | | | | | | | 492 |
| Phe | Ile | Asn | Pro | | | | | | | | | | | | | |

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Leu Asn Ala Tyr Arg Thr Thr Val Pro Val Ile Gly Gly His Ser Gly
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Val Thr Ile Leu Pro Leu Leu Ser Gln Val Gln Tyr Val Glu Trp Lys
35 40 45

Glu Asp Glu Ile Glu Pro Leu Thr Lys Arg Ile Gln Asn Ala Gly Thr
50 55 60

Glu Val Val Asn Ala Lys Ala Gly Gly Gly Ser Ala Thr Leu Ser Met
65 70 75 80

Ala Gln Ala Ala Ala Arg Phe Ala Asn Ala Val Val Arg Gly Leu Gln
85 90 95

Gly Glu Thr Val Val Glu Cys Ser Tyr Val Glu Gly Asp Gly Lys Tyr
100 105 110

Ala Arg Phe Phe Ala Gln Pro Val Arg Phe Gly Lys Glu Gly Val Glu
115 120 125

Glu Ile Leu Pro Ile Gly Lys Leu Ser Ala Leu Glu Gln Gln Ala Leu
130 135 140

Glu Thr Met Leu Pro Thr Leu Arg Ala Asp Ile Glu Leu Gly Glu Lys
145 150 155 160

Phe Ile Asn Pro

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<400> 197

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48

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| Ala | Leu | Ser | Leu | Gln | Ser | Phe | Asn | Leu | Glu | Val | Pro | Val | Asp | Asp | Lys | |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | | |
| gaa cgt atc gaa aac atc aaa cgt tac acc ggt gaa aaa tta gat acg | | | | | | | | | | | | | | | | 96 |
| Glu Arg Ile Glu Asn Ile Lys Arg Tyr Thr Gly Glu Lys Leu Asp Thr | | | | | | | | | | | | | | | | |
| 20 25 30 | | | | | | | | | | | | | | | | |
| gcg ttt gtc aac gga tta gtg gaa gcc tcg agc cgt tta cgt cgc tta | | | | | | | | | | | | | | | | 144 |
| Ala Phe Val Asn Gly Leu Val Glu Ala Ser Ser Arg Leu Arg Arg Leu | | | | | | | | | | | | | | | | |
| 35 40 45 | | | | | | | | | | | | | | | | |
| tcc ccg ccg gca ttc cgt ttc caa tta acc gaa tta gcc cgc gcc gcc | | | | | | | | | | | | | | | | 192 |
| Ser Pro Pro Ala Phe Arg Phe Gln Leu Thr Glu Leu Ala Arg Ala Ala | | | | | | | | | | | | | | | | |
| 50 55 60 | | | | | | | | | | | | | | | | |
| caa aaa cgc atc gtc tta ccg gaa ggc gac gaa ccg cgc acc att aaa | | | | | | | | | | | | | | | | 240 |
| Gln Lys Arg Ile Val Leu Pro Glu Gly Asp Glu Pro Arg Thr Ile Lys | | | | | | | | | | | | | | | | |
| 65 70 75 80 | | | | | | | | | | | | | | | | |
| gcg gcg att tta tgt gcc gaa cgc ggt atc gca gaa tgt gtg ctg tta | | | | | | | | | | | | | | | | 288 |
| Ala Ala Ile Leu Cys Ala Glu Arg Gly Ile Ala Glu Cys Val Leu Leu | | | | | | | | | | | | | | | | |
| 85 90 95 | | | | | | | | | | | | | | | | |
| gcc aaa ccg gaa gac gta caa cgc gtg gcg gaa tcc caa ggc gtt aag | | | | | | | | | | | | | | | | 336 |
| Ala Lys Pro Glu Asp Val Gln Arg Val Ala Glu Ser Gln Gly Val Lys | | | | | | | | | | | | | | | | |
| 100 105 110 | | | | | | | | | | | | | | | | |
| ttg gta aac ggc att acc gtt atc gac ccg gcg agc gtg cgt gaa aac | | | | | | | | | | | | | | | | 384 |
| Leu Val Asn Gly Ile Thr Val Ile Asp Pro Ala Ser Val Arg Glu Asn | | | | | | | | | | | | | | | | |
| 115 120 125 | | | | | | | | | | | | | | | | |
| tat gtg gca cgt ttg gtt gag cta cgc aaa gcc aaa ggc atg acc gaa | | | | | | | | | | | | | | | | 432 |
| Tyr Val Ala Arg Leu Val Glu Leu Arg Lys Ala Lys Gly Met Thr Glu | | | | | | | | | | | | | | | | |
| 130 135 140 | | | | | | | | | | | | | | | | |
| acc atg gcg cgt gaa caa ttg gaa gac aat gtt gtg ctc ggt acc atg | | | | | | | | | | | | | | | | 480 |
| Thr Met Ala Arg Glu Gln Leu Glu Asp Asn Val Val Leu Gly Thr Met | | | | | | | | | | | | | | | | |
| 145 150 155 160 | | | | | | | | | | | | | | | | |
| atg ttg gaa gcc aac caa gta gac ggt ttg gta tcc ggc gcc gta cac | | | | | | | | | | | | | | | | 528 |
| Met Leu Glu Ala Asn Gln Val Asp Gly Leu Val Ser Gly Ala Val His | | | | | | | | | | | | | | | | |
| 165 170 175 | | | | | | | | | | | | | | | | |
| acc acc gcc aac acc att cgc ccg cca atg caa atc atc aaa acc gca | | | | | | | | | | | | | | | | 576 |
| Thr Thr Ala Asn Thr Ile Arg Pro Pro Met Gln Ile Ile Lys Thr Ala | | | | | | | | | | | | | | | | |
| 180 185 190 | | | | | | | | | | | | | | | | |
| ccg ggc agc tcc att att tct tcc atc ttc ttc atg ttg cta ccg gat | | | | | | | | | | | | | | | | 624 |
| Pro Gly Ser Ser Ile Ile Ser Ser Ile Phe Phe Met Leu Leu Pro Asp | | | | | | | | | | | | | | | | |
| 195 200 205 | | | | | | | | | | | | | | | | |
| caa gta ttg gtc tat ggc gat tgc gca gtg aac ccg gat ccg a | | | | | | | | | | | | | | | | 667 |
| Gln Val Leu Val Tyr Gly Asp Cys Ala Val Asn Pro Asp Pro | | | | | | | | | | | | | | | | |
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<400> 198

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Glu Arg Ile Glu Asn Ile Lys Arg Tyr Thr Gly Glu Lys Leu Asp Thr
 20 25 30

Ala Phe Val Asn Gly Leu Val Glu Ala Ser Ser Arg Leu Arg Arg Leu
 35 40 45

Ser Pro Pro Ala Phe Arg Phe Gln Leu Thr Glu Leu Ala Arg Ala Ala
 50 55 60

Gln Lys Arg Ile Val Leu Pro Glu Gly Asp Glu Pro Arg Thr Ile Lys
 65 70 75 80

Ala Ala Ile Leu Cys Ala Glu Arg Gly Ile Ala Glu Cys Val Leu Leu
 85 90 95

Ala Lys Pro Glu Asp Val Gln Arg Val Ala Glu Ser Gln Gly Val Lys
 100 105 110

Leu Val Asn Gly Ile Thr Val Ile Asp Pro Ala Ser Val Arg Glu Asn
 115 120 125

Tyr Val Ala Arg Leu Val Glu Leu Arg Lys Ala Lys Gly Met Thr Glu
 130 135 140

Thr Met Ala Arg Glu Gln Leu Glu Asp Asn Val Val Leu Gly Thr Met
 145 150 155 160

Met Leu Glu Ala Asn Gln Val Asp Gly Leu Val Ser Gly Ala Val His
 165 170 175

Thr Thr Ala Asn Thr Ile Arg Pro Pro Met Gln Ile Ile Lys Thr Ala
 180 185 190

Pro Gly Ser Ser Ile Ile Ser Ser Ile Phe Phe Met Leu Leu Pro Asp
 195 200 205

Gln Val Leu Val Tyr Gly Asp Cys Ala Val Asn Pro Asp Pro
 210 215 220

<210> 199
 <211> 267
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1)..(267)

<400> 199
 ggt ata cgc cct gag cat tta att ccg tct gat gag gca gaa gtt acg 48
 Gly Ile Arg Pro Glu His Leu Ile Pro Ser Asp Glu Ala Glu Val Thr
 1 5 10 15
 ttg cgc agc aat gtg cag gtg gtg gaa ttg ctt ggt aac gaa acg caa 96
 Leu Arg Ser Asn Val Gln Val Val Glu Leu Leu Gly Asn Glu Thr Gln
 20 25 30
 att cac ctt gaa atc cct gaa att aaa caa ccg acc tta att tat cgc 144
 Ile His Leu Glu Ile Pro Glu Ile Lys Gln Pro Thr Leu Ile Tyr Arg
 35 40 45
 caa aat gat gtg gtg ttg gtg aag gag ggg gaa acg atg gac atc ggc 192
 Gln Asn Asp Val Val Leu Val Lys Glu Gly Glu Thr Met Asp Ile Gly
 50 55 60
 atc att ccg gaa cgt tgc cat ctg ttt aaa gaa gac ggc acc gcc tgc 240
 Ile Ile Pro Glu Arg Cys His Leu Phe Lys Glu Asp Gly Thr Ala Cys
 65 70 75 80
 caa cgt ttg tat aaa gaa aaa ggc gtt 267
 Gln Arg Leu Tyr Lys Glu Lys Gly Val
 85

<210> 200
 <211> 89
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 200
 Gly Ile Arg Pro Glu His Leu Ile Pro Ser Asp Glu Ala Glu Val Thr
 1 5 10 15
 Leu Arg Ser Asn Val Gln Val Val Glu Leu Leu Gly Asn Glu Thr Gln
 20 25 30
 Ile His Leu Glu Ile Pro Glu Ile Lys Gln Pro Thr Leu Ile Tyr Arg
 35 40 45

Gln Asn Asp Val Val Leu Val Lys Glu Gly Glu Thr Met Asp Ile Gly
 50 55 60

Ile Ile Pro Glu Arg Cys His Leu Phe Lys Glu Asp Gly Thr Ala Cys
 65 70 75 80

Gln Arg Leu Tyr Lys Glu Lys Gly Val
 85

<210> 201
 <211> 219
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1)..(219)

<400> 201
 tac atc gtc atc gcc ttt gtg gtg tca cag tta ttg gac gga aat ctg 48
 Tyr Ile Val Ile Ala Phe Val Val Ser Gln Leu Leu Asp Gly Asn Leu
 1 5 10 15

ctg gtg ccg ttt ttg ttc tcc gaa gcg gtc aat ctg cac ccg ttg gtg 96
 Leu Val Pro Phe Leu Phe Ser Glu Ala Val Asn Leu His Pro Leu Val
 20 25 30

atc atc att gcc gtt ttg att ttc ggt ggc ttg tgg gga ttc tgg ggc 144
 Ile Ile Ile Ala Val Leu Ile Phe Gly Gly Leu Trp Gly Phe Trp Gly
 35 40 45

gta ttt ttt gcc att ccg ctg gcg act ttg gtg aaa gcg gtg gtg aac 192
 Val Phe Phe Ala Ile Pro Leu Ala Thr Leu Val Lys Ala Val Val Asn
 50 55 60

gct tgg cct tcc aat gaa gcg gtg gaa 219
 Ala Trp Pro Ser Asn Glu Ala Val Glu
 65 70

<210> 202
 <211> 73
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 202

Tyr Ile Val Ile Ala Phe Val Val Ser Gln Leu Leu Asp Gly Asn Leu
 1 5 10 15

Leu Val Pro Phe Leu Phe Ser Glu Ala Val Asn Leu His Pro Leu Val

20

25

30

Ile Ile Ile Ala Val Leu Ile Phe Gly Gly Leu Trp Gly Phe Trp Gly
35 40 45

Val Phe Phe Ala Ile Pro Leu Ala Thr Leu Val Lys Ala Val Val Asn
50 55 60

Ala Trp Pro Ser Asn Glu Ala Val Glu
65 70

<210> 203

<211> 631

<212> DNA

<213> Actinobacillus actinomycetemcomitans

<220>

<221> CDS

<222> (1)..(630)

<400> 203

cct ttc gcc atc gaa agt gac gag aaa ttt gcc tcc gcc tgc att cgt 48
Pro Phe Ala Ile Glu Ser Asp Glu Lys Phe Ala Ser Ala Cys Ile Arg
1 5 10 15

tgc ggt cag tgc gtg caa gcc tgc cct tat gat atg ttg cat ttg gca 96
Cys Gly Gln Cys Val Gln Ala Cys Pro Tyr Asp Met Leu His Leu Ala
20 25 30

tcg ttg cta tca cca atg gaa gcg ggg acg ccg tat ttt atc gcg cgc 144
Ser Leu Leu Ser Pro Met Glu Ala Gly Thr Pro Tyr Phe Ile Ala Arg
35 40 45

gat aaa cct tgc gaa atg tgt ccg gat att cct tgc gcc cat gcg tgt 192
Asp Lys Pro Cys Glu Met Cys Pro Asp Ile Pro Cys Ala His Ala Cys
50 55 60

ccg agc ggt gcg tta gat cgt gag gcg cag gat att aat caa tcc cgt 240
Pro Ser Gly Ala Leu Asp Arg Glu Ala Gln Asp Ile Asn Gln Ser Arg
65 70 75 80

atg ggg ctg gcg gtg ttg ctg gat cat gaa acc tgc ttg aac tgg caa 288
Met Gly Leu Ala Val Leu Leu Asp His Glu Thr Cys Leu Asn Trp Gln
85 90 95

ggc ttg cgt tgc gat gtg tgt tat cgg gtt tgt ccg ttg att gat aaa 336
Gly Leu Arg Cys Asp Val Cys Tyr Arg Val Cys Pro Leu Ile Asp Lys
100 105 110

gcc att acg ctg gaa agc cat cgt aat gag cgc acc ggc aag cac gcg 384
Ala Ile Thr Leu Glu Ser His Arg Asn Glu Arg Thr Gly Lys His Ala
115 120 125

gtg ttt att ccg acg gtg cat tcc gat ggc tgt acc ggc tgt ggc aaa 432
 Val Phe Ile Pro Thr Val His Ser Asp Gly Cys Thr Gly Cys Gly Lys
 130 135 140

tgc gaa caa gcg tgt gtc ttg gaa gaa gcg gca atc aaa gta tta ccg 480
 Cys Glu Gln Ala Cys Val Leu Glu Glu Ala Ala Ile Lys Val Leu Pro
 145 150 155 160

atg cat ttg gcg aaa ggc atg tta ggc aaa cat tat cgt ttg ggt tgg 528
 Met His Leu Ala Lys Gly Met Leu Gly Lys His Tyr Arg Leu Gly Trp
 165 170 175

gaa gaa aag gcg aaa gcc gga cat tcc ttg gcg ccg aaa gat ttg att 576
 Glu Glu Lys Ala Lys Ala Gly His Ser Leu Ala Pro Lys Asp Leu Ile
 180 185 190

tcg atg ccg acc cgt atg ccg gaa gcc aca atg ccg gta atg ggc gca 624
 Ser Met Pro Thr Arg Met Pro Glu Ala Thr Met Pro Val Met Gly Ala
 195 200 205

gaa gac a 631
 Glu Asp
 210

<210> 204
 <211> 210
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 204

Pro Phe Ala Ile Glu Ser Asp Glu Lys Phe Ala Ser Ala Cys Ile Arg
 1 5 10 15

Cys Gly Gln Cys Val Gln Ala Cys Pro Tyr Asp Met Leu His Leu Ala
 20 25 30

Ser Leu Leu Ser Pro Met Glu Ala Gly Thr Pro Tyr Phe Ile Ala Arg
 35 40 45

Asp Lys Pro Cys Glu Met Cys Pro Asp Ile Pro Cys Ala His Ala Cys
 50 55 60

Pro Ser Gly Ala Leu Asp Arg Glu Ala Gln Asp Ile Asn Gln Ser Arg
 65 70 75 80

Met Gly Leu Ala Val Leu Leu Asp His Glu Thr Cys Leu Asn Trp Gln
 85 90 95

Gly Leu Arg Cys Asp Val Cys Tyr Arg Val Cys Pro Leu Ile Asp Lys

Ala Ile Thr Leu Glu Ser His Arg Asn Glu Arg Thr Gly Lys His Ala
115 120 125

Val Phe Ile Pro Thr Val His Ser Asp Gly Cys Thr Gly Cys Gly Lys
130 135 140

Cys Glu Gln Ala Cys Val Leu Glu Glu Ala Ala Ile Lys Val Leu Pro
145 150 155 160

Met His Leu Ala Lys Gly Met Leu Gly Lys His Tyr Arg Leu Gly Trp
165 170 175

Glu Glu Lys Ala Lys Ala Gly His Ser Leu Ala Pro Lys Asp Leu Ile
180 185 190

Ser Met Pro Thr Arg Met Pro Glu Ala Thr Met Pro Val Met Gly Ala
195 200 205

Glu Asp
210

<210> 205
<211> 354
<212> DNA
<213> Actinobacillus actinomycetemcomitans

<220>
<221> CDS
<222> (1) .. (354)

<400> 205
tgc ctg gaa cgg gtg aaa cgg ttg gag aag caa ggg gtg att atg ggg 48
Cys Leu Glu Arg Val Lys Arg Leu Glu Lys Gln Gly Val Ile Met Gly
1 5 10 15
tat cgt gct ttg ctg aat ccc gca tta ttg gat tcg ccg ttg ttg gtg 96
Tyr Arg Ala Leu Leu Asn Pro Ala Leu Leu Asp Ser Pro Leu Leu Val
20 25 30
atc gtg gaa att acg ctg gta cgt ggc aag ccc gat gtg ttt gaa gaa 144
Ile Val Glu Ile Thr Leu Val Arg Gly Lys Pro Asp Val Phe Glu Glu
35 40 45
ttt aac gcg gcg gtg cag cag tta gat gaa att cag gaa tgc cat ttg 192
Phe Asn Ala Ala Val Gln Gln Leu Asp Glu Ile Gln Glu Cys His Leu
50 55 60

gtt tcc ggt gat ttc gat tat tta ttg aaa aca cgg gtg gcg gat atg 240
 Val Ser Gly Asp Phe Asp Tyr Leu Leu Lys Thr Arg Val Ala Asp Met
 65 70 75 80

gcg gcg tat cgt aaa ttg ctg ggg acc acc ttg ctg cgc ctg ccc ggg 288
 Ala Ala Tyr Arg Lys Leu Leu Gly Thr Thr Leu Leu Arg Leu Pro Gly
 85 90 95

gtg aac gac acg cgc act tat gtg gtg atg gaa gaa gtg aaa caa acg 336
 Val Asn Asp Thr Arg Thr Tyr Val Val Met Glu Glu Val Lys Gln Thr
 100 105 110

aat ttt tta cag tta aaa 354
 Asn Phe Leu Gln Leu Lys
 115

<210> 206
 <211> 118
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 206

Cys Leu Glu Arg Val Lys Arg Leu Glu Lys Gln Gly Val Ile Met Gly
 1 5 10 15

Tyr Arg Ala Leu Leu Asn Pro Ala Leu Leu Asp Ser Pro Leu Leu Val
 20 25 30

Ile Val Glu Ile Thr Leu Val Arg Gly Lys Pro Asp Val Phe Glu Glu
 35 40 45

Phe Asn Ala Ala Val Gln Gln Leu Asp Glu Ile Gln Glu Cys His Leu
 50 55 60

Val Ser Gly Asp Phe Asp Tyr Leu Leu Lys Thr Arg Val Ala Asp Met
 65 70 75 80

Ala Ala Tyr Arg Lys Leu Leu Gly Thr Thr Leu Leu Arg Leu Pro Gly
 85 90 95

Val Asn Asp Thr Arg Thr Tyr Val Val Met Glu Glu Val Lys Gln Thr
 100 105 110

Asn Phe Leu Gln Leu Lys
 115

<210> 207

<211> 613
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1)..(612)

<400> 207

| | |
|---|----|
| atg agt tta aaa ata tta tta aat cag ccg caa tac gat ccg att cgt | 48 |
| Met Ser Leu Lys Ile Leu Leu Asn Gln Pro Gln Tyr Asp Pro Ile Arg | |
| 1 5 10 15 | |

| | |
|---|----|
| gac aaa aaa gcc gag cgc aac tta ttt gcc cgt cgc gct ttg gtg tca | 96 |
| Asp Lys Lys Ala Glu Arg Asn Leu Phe Ala Arg Arg Ala Leu Val Ser | |
| 20 25 30 | |

| | |
|---|-----|
| ttt atc ggc gtg ttg gtg ttg tcg gtg gtg tta att tta aac ttg tat | 144 |
| Phe Ile Gly Val Leu Val Leu Ser Val Val Leu Ile Leu Asn Leu Tyr | |
| 35 40 45 | |

| | |
|---|-----|
| gat ttg cag gtg gtc aat tat gac ggt tat caa acc cgt tcc aac ggc | 192 |
| Asp Leu Gln Val Val Asn Tyr Asp Gly Tyr Gln Thr Arg Ser Asn Gly | |
| 50 55 60 | |

| | |
|---|-----|
| aat cgt att aag ttg ttg ccg ctg ccg ccg act cgc ggg ttg att tat | 240 |
| Asn Arg Ile Lys Leu Leu Pro Leu Pro Pro Thr Arg Gly Leu Ile Tyr | |
| 65 70 75 80 | |

| | |
|---|-----|
| gat cgc aac ggc aaa ctg ctg gcg gaa aat ctg acc ttt ttc ggg ctt | 288 |
| Asp Arg Asn Gly Lys Leu Leu Ala Glu Asn Leu Thr Phe Phe Gly Leu | |
| 85 90 95 | |

| | |
|---|-----|
| tat atc gtg cct gaa aag gtg gaa aat tta gac cgc act ttt gag gag | 336 |
| Tyr Ile Val Pro Glu Lys Val Glu Asn Leu Asp Arg Thr Phe Glu Glu | |
| 100 105 110 | |

| | |
|---|-----|
| ctg agg gtg ttg gta ggc tta act gat gaa gat att gcg aat ttt aac | 384 |
| Leu Arg Val Leu Val Gly Leu Thr Asp Glu Asp Ile Ala Asn Phe Asn | |
| 115 120 125 | |

| | |
|---|-----|
| aag gaa cgg cgt cgc tcc tcc cgt tat atg ccg att atg ctg aaa cga | 432 |
| Lys Glu Arg Arg Arg Ser Ser Arg Tyr Met Pro Ile Met Leu Lys Arg | |
| 130 135 140 | |

| | |
|---|-----|
| aat cta acg gaa gag caa att gcc cgt ttt gcg gtg aat caa tac aat | 480 |
| Asn Leu Thr Glu Glu Gln Ile Ala Arg Phe Ala Val Asn Gln Tyr Asn | |
| 145 150 155 160 | |

| | |
|---|-----|
| ttc cag agt ttg gat gtg aaa ccc tac ttt aag cgc cat tat tta tac | 528 |
| Phe Gln Ser Leu Asp Val Lys Pro Tyr Phe Lys Arg His Tyr Leu Tyr | |
| 165 170 175 | |

| | |
|---|-----|
| ggc gaa ccg ctg acc cat gtt ttg ggc tat gtg tca aaa att aac gat | 576 |
| Gly Glu Pro Leu Thr His Val Leu Gly Tyr Val Ser Lys Ile Asn Asp | |
| 180 185 190 | |

cgt gat gta gaa cgc ttg aaa aaa gag gaa aag tac g
 Arg Asp Val Glu Arg Leu Lys Lys Glu Glu Lys Tyr
 195 200

613

<210> 208
 <211> 204
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 208

Met Ser Leu Lys Ile Leu Leu Asn Gln Pro Gln Tyr Asp Pro Ile Arg
 1 5 10 15

Asp Lys Lys Ala Glu Arg Asn Leu Phe Ala Arg Arg Ala Leu Val Ser
 20 25 30

Phe Ile Gly Val Leu Val Leu Ser Val Val Leu Ile Leu Asn Leu Tyr
 35 40 45

Asp Leu Gln Val Val Asn Tyr Asp Gly Tyr Gln Thr Arg Ser Asn Gly
 50 55 60

Asn Arg Ile Lys Leu Leu Pro Leu Pro Pro Thr Arg Gly Leu Ile Tyr
 65 70 75 80

Asp Arg Asn Gly Lys Leu Leu Ala Glu Asn Leu Thr Phe Phe Gly Leu
 85 90 95

Tyr Ile Val Pro Glu Lys Val Glu Asn Leu Asp Arg Thr Phe Glu Glu
 100 105 110

Leu Arg Val Leu Val Gly Leu Thr Asp Glu Asp Ile Ala Asn Phe Asn
 115 120 125

Lys Glu Arg Arg Arg Ser Ser Arg Tyr Met Pro Ile Met Leu Lys Arg
 130 135 140

Asn Leu Thr Glu Glu Gln Ile Ala Arg Phe Ala Val Asn Gln Tyr Asn
 145 150 155 160

Phe Gln Ser Leu Asp Val Lys Pro Tyr Phe Lys Arg His Tyr Leu Tyr
 165 170 175

Gly Glu Pro Leu Thr His Val Leu Gly Tyr Val Ser Lys Ile Asn Asp

180

185

190

Arg Asp Val Glu Arg Leu Lys Lys Glu Glu Lys Tyr
 195 200

<210> 209
 <211> 631
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1)..(630)

<400> 209
 cgc tta gca caa cat tca tcg gaa aaa ctg acc gca ctt tcc cat gca 48
 Arg Leu Ala Gln His Ser Ser Glu Lys Leu Thr Ala Leu Ser His Ala
 1 5 10 15
 acc acg cat tct gac gcc caa agt gcg gta gaa aat cag agt gaa tct 96
 Thr Thr His Ser Asp Ala Gln Ser Ala Val Glu Asn Gln Ser Glu Ser
 20 25 30
 gat agc gac gaa act gat gcg gat gtg ttg tta ggc gag gat tat cgt 144
 Asp Ser Asp Glu Thr Asp Ala Asp Val Leu Leu Gly Glu Asp Tyr Arg
 35 40 45
 tgg gag tgg agc aac ccc gag ctt gcc aat att gag caa ggc cct aag 192
 Trp Glu Trp Ser Asn Pro Glu Leu Ala Asn Ile Glu Gln Gly Pro Lys
 50 55 60
 ccc tcc gaa atc aaa gcc gcc att ttg cag gac atc act cct gaa tta 240
 Pro Ser Glu Ile Lys Ala Ala Ile Leu Gln Asp Ile Thr Pro Glu Leu
 65 70 75 80
 cag caa aaa atc gtc aat tta act caa acg caa gat cgc tgg gcg cag 288
 Gln Gln Lys Ile Val Asn Leu Thr Gln Thr Gln Asp Arg Trp Ala Gln
 85 90 95
 ctg att gag caa agc ggt gta gaa aat ctc acc aaa gag ttc gcc tta 336
 Leu Ile Glu Gln Ser Gly Val Glu Asn Leu Thr Lys Glu Phe Ala Leu
 100 105 110
 aat acc ttc att tgg cag gaa aat gac gcg gag ttt aaa ctt ggt gtg 384
 Asn Thr Phe Ile Trp Gln Glu Asn Asp Ala Glu Phe Lys Leu Gly Val
 115 120 125
 cgt tcc agc cac ggg cat tta aat cag gat aag cat cgg aag ctg tta 432
 Arg Ser Ser His Gly His Leu Asn Gln Asp Lys His Arg Lys Leu Leu
 130 135 140
 caa cag gca ctt tca gtg gtg tta cag aaa gaa att gca ctg acc gtg 480
 Gln Gln Ala Leu Ser Val Val Leu Gln Lys Glu Ile Ala Leu Thr Val
 145 150 155 160

| | |
|---|-----|
| gaa att aac gac gac gaa caa tat ctg acg ccg acg gat tat cgc cgt | 528 |
| Glu Ile Asn Asp Asp Glu Gln Tyr Leu Thr Pro Thr Asp Tyr Arg Arg | |
| 165 170 175 | |
| aaa acc tat gct caa ttg cgt gag cag gcg aaa cag gat ttg ttg caa | 576 |
| Lys Thr Tyr Ala Gln Leu Arg Glu Gln Ala Lys Gln Asp Leu Leu Gln | |
| 180 185 190 | |
| gat gaa aag ttg caa cta ttg gag cgt gaa ttt gat tgt cag gtt gat | 624 |
| Asp Glu Lys Leu Gln Leu Leu Glu Arg Glu Phe Asp Cys Gln Val Asp | |
| 195 200 205 | |
| gtg aaa a | 631 |
| Val Lys | |
| 210 | |

<210> 210
 <211> 210
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans
 <400> 210

| | |
|---|--|
| Arg Leu Ala Gln His Ser Ser Glu Lys Leu Thr Ala Leu Ser His Ala | |
| 1 5 10 15 | |
| Thr Thr His Ser Asp Ala Gln Ser Ala Val Glu Asn Gln Ser Glu Ser | |
| 20 25 30 | |
| Asp Ser Asp Glu Thr Asp Ala Asp Val Leu Leu Gly Glu Asp Tyr Arg | |
| 35 40 45 | |
| Trp Glu Trp Ser Asn Pro Glu Leu Ala Asn Ile Glu Gln Gly Pro Lys | |
| 50 55 60 | |
| Pro Ser Glu Ile Lys Ala Ala Ile Leu Gln Asp Ile Thr Pro Glu Leu | |
| 65 70 75 80 | |
| Gln Gln Lys Ile Val Asn Leu Thr Gln Thr Gln Asp Arg Trp Ala Gln | |
| 85 90 95 | |
| Leu Ile Glu Gln Ser Gly Val Glu Asn Leu Thr Lys Glu Phe Ala Leu | |
| 100 105 110 | |
| Asn Thr Phe Ile Trp Gln Glu Asn Asp Ala Glu Phe Lys Leu Gly Val | |
| 115 120 125 | |
| Arg Ser Ser His Gly His Leu Asn Gln Asp Lys His Arg Lys Leu Leu | |

130

135

140

Gln Gln Ala Leu Ser Val Val Leu Gln Lys Glu Ile Ala Leu Thr Val
145 150 155 160

Glu Ile Asn Asp Asp Glu Gln Tyr Leu Thr Pro Thr Asp Tyr Arg Arg
165 170 175

Lys Thr Tyr Ala Gln Leu Arg Glu Gln Ala Lys Gln Asp Leu Leu Gln
180 185 190

Asp Glu Lys Leu Gln Leu Leu Glu Arg Glu Phe Asp Cys Gln Val Asp
195 200 205

Val Lys
210

<210> 211

<211> 1155

<212> DNA

<213> Actinobacillus actinomycetemcomitans

<220>

<221> CDS

<222> (1)..(1155)

<400> 211

ccc gaa cat ata aaa gac aag gta tcg aga ggt ttc att atg gca agt 48
Pro Glu His Ile Lys Asp Lys Val Ser Arg Gly Phe Ile Met Ala Ser
1 5 10 15

gta aca ttg cgc aat gtg ggc aaa tct tac gga aac gta cat att tcc 96
Val Thr Leu Arg Asn Val Gly Lys Ser Tyr Gly Asn Val His Ile Ser
20 25 30

aaa gat att aat ttg gat att gaa gaa ggc gaa ttt gtc gtc ttt gtc 144
Lys Asp Ile Asn Leu Asp Ile Glu Glu Gly Glu Phe Val Val Phe Val
35 40 45

gga ccg tcc ggt tgc ggt aaa tcc aca tta ttg cga atg att gcc gga 192
Gly Pro Ser Gly Cys Gly Lys Ser Thr Leu Leu Arg Met Ile Ala Gly
50 55 60

ctt gag gat att acc acc ggt gaa ctt tac atc ggt gaa aaa cgg atg 240
Leu Glu Asp Ile Thr Thr Gly Glu Leu Tyr Ile Gly Glu Lys Arg Met
65 70 75 80

aac gat gtg ccg ccg gca aag cgc ggt atc ggt atg gtg ttc caa tct 288
Asn Asp Val Pro Pro Ala Lys Arg Gly Ile Gly Met Val Phe Gln Ser
85 90 95

| | |
|---|------|
| tac gcc ctg tac ccg cac ttg gat gtg gca gaa aat atg tct ttc ggg Tyr Ala Leu Tyr Pro His Leu Asp Val Ala Glu Asn Met Ser Phe Gly 100 105 110 | 336 |
| ctg aaa tta gcc ggt gta aat aaa acg gaa cgg gat cag cgc gtt aat Leu Lys Leu Ala Gly Val Asn Lys Thr Glu Arg Asp Gln Arg Val Asn 115 120 125 | 384 |
| cag gtt gcc gaa att tta cag ctt gcc cat ttg ctt gaa cgt aaa ccg Gln Val Ala Glu Ile Leu Gln Leu Ala His Leu Glu Arg Lys Pro 130 135 140 | 432 |
| aaa gcc ttg tcg ggc ggt cag cgt caa cgt gtg gcg att ggg cga acc Lys Ala Leu Ser Gly Gly Gln Arg Gln Arg Val Ala Ile Gly Arg Thr 145 150 155 160 | 480 |
| ctt gtt tcc cag cca gaa gta ttc ttg ctg gac gaa ccg ctt tcc aac Leu Val Ser Gln Pro Glu Val Phe Leu Leu Asp Glu Pro Leu Ser Asn 165 170 175 | 528 |
| tta gat gcc gcc ttg cgc gta caa atg cgg gtg gaa atc tcc aaa tta Leu Asp Ala Ala Leu Arg Val Gln Met Arg Val Glu Ile Ser Lys Leu 180 185 190 | 576 |
| cac aaa aaa ctc aac cgc acc atg att tat gtt acc cat gac caa gtg His Lys Lys Leu Asn Arg Thr Met Ile Tyr Val Thr His Asp Gln Val 195 200 205 | 624 |
| gaa gcc atg acc ctg gcg gac aaa atc gtg gtg ttg aat gcg ggc ggt Glu Ala Met Thr Leu Ala Asp Lys Ile Val Val Leu Asn Ala Gly Gly 210 215 220 | 672 |
| att gcg cag gtg ggg aaa ccg ctg gaa ctt tac cat tat ccg caa aat Ile Ala Gln Val Gly Lys Pro Leu Glu Leu Tyr His Tyr Pro Gln Asn 225 230 235 240 | 720 |
| cgt ttc gtg gcc ggt ttt atc ggt tca ccg aaa atg aat ttc ctg ccg Arg Phe Val Ala Gly Phe Ile Gly Ser Pro Lys Met Asn Phe Leu Pro 245 250 255 | 768 |
| gtg aaa gtg act gct gtg gaa aaa gag cgg gtg caa atc gaa ttg ccc Val Lys Val Thr Ala Val Glu Lys Glu Arg Val Gln Ile Glu Leu Pro 260 265 270 | 816 |
| gac gcc aac cat cat aac ttc tgg atc ccg gtt tcc ggt aat ggc gtg Asp Ala Asn His His Asn Phe Trp Ile Pro Val Ser Gly Asn Gly Val 275 280 285 | 864 |
| aaa gtg ggt gaa aac ctt tca tta ggt ata cgc cct gag cat tta att Lys Val Gly Glu Asn Leu Ser Leu Gly Ile Arg Pro Glu His Leu Ile 290 295 300 | 912 |
| ccg tct gat gag gca gaa gtt acg ttg cgc agc aat gtg cag gtg gtg Pro Ser Asp Glu Ala Glu Val Thr Leu Arg Ser Asn Val Gln Val Val 305 310 315 320 | 960 |
| gaa ttg ctt ggt aac gaa acg caa att cac ctt gaa atc cct gaa att | 1008 |

Glu Leu Leu Gly Asn Glu Thr Gln Ile His Leu Glu Ile Pro Glu Ile
325 330 335

aaa caa ccg acc tta att tat cgc caa aat gat gtg gtg ttg gtg aag 1056
Lys Gln Pro Thr Leu Ile Tyr Arg Gln Asn Asp Val Val Leu Val Lys
340 345 350

gag ggg gaa acg atg gac atc ggc atc att ccg gaa cgt tgc cat ctg 1104
Glu Gly Glu Thr Met Asp Ile Gly Ile Ile Pro Glu Arg Cys His Leu
355 360 365

ttt aaa gaa gac ggc acc gcc tgc caa cgt ttg tat aaa gaa aaa ggc 1152
Phe Lys Glu Asp Gly Thr Ala Cys Gln Arg Leu Tyr Lys Glu Lys Gly
370 375 380

gtt 1155
Val
385

<210> 212
<211> 385
<212> PRT
<213> Actinobacillus actinomycetemcomitans

<400> 212

Pro Glu His Ile Lys Asp Lys Val Ser Arg Gly Phe Ile Met Ala Ser
1 5 10 15

Val Thr Leu Arg Asn Val Gly Lys Ser Tyr Gly Asn Val His Ile Ser
20 25 30

Lys Asp Ile Asn Leu Asp Ile Glu Glu Gly Glu Phe Val Val Phe Val
35 40 45

Gly Pro Ser Gly Cys Gly Lys Ser Thr Leu Leu Arg Met Ile Ala Gly
50 55 60

Leu Glu Asp Ile Thr Thr Gly Glu Leu Tyr Ile Gly Glu Lys Arg Met
65 70 75 80

Asn Asp Val Pro Pro Ala Lys Arg Gly Ile Gly Met Val Phe Gln Ser
85 90 95

Tyr Ala Leu Tyr Pro His Leu Asp Val Ala Glu Asn Met Ser Phe Gly
100 105 110

Leu Lys Leu Ala Gly Val Asn Lys Thr Glu Arg Asp Gln Arg Val Asn
115 120 125

Gln Val Ala Glu Ile Leu Gln Leu Ala His Leu Leu Glu Arg Lys Pro
 130 135 140

Lys Ala Leu Ser Gly Gly Gln Arg Gln Arg Val Ala Ile Gly Arg Thr
 145 150 155 160

Leu Val Ser Gln Pro Glu Val Phe Leu Leu Asp Glu Pro Leu Ser Asn
 165 170 175

Leu Asp Ala Ala Leu Arg Val Gln Met Arg Val Glu Ile Ser Lys Leu
 180 185 190

His Lys Lys Leu Asn Arg Thr Met Ile Tyr Val Thr His Asp Gln Val
 195 200 205

Glu Ala Met Thr Leu Ala Asp Lys Ile Val Val Leu Asn Ala Gly Gly
 210 215 220

Ile Ala Gln Val Gly Lys Pro Leu Glu Leu Tyr His Tyr Pro Gln Asn
 225 230 235 240

Arg Phe Val Ala Gly Phe Ile Gly Ser Pro Lys Met Asn Phe Leu Pro
 245 250 255

Val Lys Val Thr Ala Val Glu Lys Glu Arg Val Gln Ile Glu Leu Pro
 260 265 270

Asp Ala Asn His His Asn Phe Trp Ile Pro Val Ser Gly Asn Gly Val
 275 280 285

Lys Val Gly Glu Asn Leu Ser Leu Gly Ile Arg Pro Glu His Leu Ile
 290 295 300

Pro Ser Asp Glu Ala Glu Val Thr Leu Arg Ser Asn Val Gln Val Val
 305 310 315 320

Glu Leu Leu Gly Asn Glu Thr Gln Ile His Leu Glu Ile Pro Glu Ile
 325 330 335

Lys Gln Pro Thr Leu Ile Tyr Arg Gln Asn Asp Val Val Leu Val Lys
 340 345 350

Glu Gly Glu Thr Met Asp Ile Gly Ile Ile Pro Glu Arg Cys His Leu
 355 360 365

Phe Lys Glu Asp Gly Thr Ala Cys Gln Arg Leu Tyr Lys Glu Lys Gly
 370 375 380

Val
 385

<210> 213
 <211> 447
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1)..(447)

<400> 213
 atg cca aaa aat gcg caa ttc tac ctg ctt tcc gat gcc tct ccc gca 48
 Met Pro Lys Asn Ala Gln Phe Tyr Leu Leu Ser Asp Ala Ser Pro Ala
 1 5 10 15
 cag acg aat ttg tct gcg gtg gaa agc ctt gcc tgc aat ttg gcg gcg 96
 Gln Thr Asn Leu Ser Ala Val Glu Ser Leu Ala Cys Asn Leu Ala Ala
 20 25 30
 tcc gcc tgg cgt ttg gga aaa cgg gtt ctg ttg gcg tgt gaa aat gaa 144
 Ser Ala Trp Arg Leu Gly Lys Arg Val Leu Leu Ala Cys Glu Asn Glu
 35 40 45
 gcg cag gcg ctc aat att gat gaa gcc ctt tgg caa cgg gaa ccg gac 192
 Ala Gln Ala Leu Asn Ile Asp Glu Ala Leu Trp Gln Arg Glu Pro Asp
 50 55 60
 gaa ttc gtc ccg cac aac ctt tcc ggc gaa gcc acc acg tat gcc acg 240
 Glu Phe Val Pro His Asn Leu Ser Gly Glu Ala Thr Thr Tyr Ala Thr
 65 70 75 80
 ccc atc gaa atc agc tgg acg ggc aaa cgc aac gca caa agc cgc gat 288
 Pro Ile Glu Ile Ser Trp Thr Gly Lys Arg Asn Ala Gln Ser Arg Asp
 85 90 95
 ttg ctg att aat tta caa ccg cag ctg ccg gaa ttc atc aac agc ttt 336
 Leu Leu Ile Asn Leu Gln Pro Gln Leu Pro Glu Phe Ile Asn Ser Phe
 100 105 110
 aac caa att atc gat ttc gta ccc gcc gaa gaa caa caa aaa gct tta 384
 Asn Gln Ile Ile Asp Phe Val Pro Ala Glu Glu Gln Gln Lys Ala Leu
 115 120 125
 gcg cgg gaa cgt tat aaa caa ttg agg cag ttg ggc tgg gaa ttg agt 432
 Ala Arg Glu Arg Tyr Lys Gln Leu Arg Gln Leu Gly Trp Glu Leu Ser

130

135

140

acg gag cag gcg ggg
 Thr Glu Gln Ala Gly
 145

447

<210> 214
 <211> 149
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 214

Met Pro Lys Asn Ala Gln Phe Tyr Leu Leu Ser Asp Ala Ser Pro Ala
 1 5 10 15

Gln Thr Asn Leu Ser Ala Val Glu Ser Leu Ala Cys Asn Leu Ala Ala
 20 25 30

Ser Ala Trp Arg Leu Gly Lys Arg Val Leu Leu Ala Cys Glu Asn Glu
 35 40 45

Ala Gln Ala Leu Asn Ile Asp Glu Ala Leu Trp Gln Arg Glu Pro Asp
 50 55 60

Glu Phe Val Pro His Asn Leu Ser Gly Glu Ala Thr Thr Tyr Ala Thr
 65 70 75 80

Pro Ile Glu Ile Ser Trp Thr Gly Lys Arg Asn Ala Gln Ser Arg Asp
 85 90 95

Leu Leu Ile Asn Leu Gln Pro Gln Leu Pro Glu Phe Ile Asn Ser Phe
 100 105 110

Asn Gln Ile Ile Asp Phe Val Pro Ala Glu Glu Gln Gln Lys Ala Leu
 115 120 125

Ala Arg Glu Arg Tyr Lys Gln Leu Arg Gln Leu Gly Trp Glu Leu Ser
 130 135 140

Thr Glu Gln Ala Gly
 145

<210> 215
 <211> 774
 <212> DNA

<213> Actinobacillus actinomycetemcomitans

<220>

<221> CDS

<222> (1) .. (774)

<400> 215

| | |
|---|----|
| aaa gac aac aaa atc tgg cac ttc acc tta cga aaa gaa gca ata tgg | 48 |
| Lys Asp Asn Lys Ile Trp His Phe Thr Leu Arg Lys Glu Ala Ile Trp | |
| 1 5 10 15 | |

| | |
|---|----|
| tct aac ggc gaa ccg gtg act gcg cag caa ttt gtt gca agc tgg caa | 96 |
| Ser Asn Gly Glu Pro Val Thr Ala Gln Gln Phe Val Ala Ser Trp Gln | |
| 20 25 30 | |

| | |
|---|-----|
| cgg ctg gcg caa tcg gat tct cct tta aag cac tat tta cgc tac ctt | 144 |
| Arg Leu Ala Gln Ser Asp Ser Pro Leu Lys His Tyr Leu Arg Tyr Leu | |
| 35 40 45 | |

| | |
|---|-----|
| aac tta gtc aac gcg gag aaa gtg tta cag caa act ctg ctg cca gag | 192 |
| Asn Leu Val Asn Ala Glu Lys Val Leu Gln Gln Thr Leu Leu Pro Glu | |
| 50 55 60 | |

| | |
|---|-----|
| cag ttg gga att gtc gcg gaa aat gac cgc act tta cgc tta act tta | 240 |
| Gln Leu Gly Ile Val Ala Glu Asn Asp Arg Thr Leu Arg Leu Thr Leu | |
| 65 70 75 80 | |

| | |
|---|-----|
| gat aaa gcg acc cct tac ttg ccg caa atg ctg gcg cat atc agc ctg | 288 |
| Asp Lys Ala Thr Pro Tyr Leu Pro Gln Met Leu Ala His Ile Ser Leu | |
| 85 90 95 | |

| | |
|---|-----|
| ttg cca caa tat ttg tcg cca cat gaa ggc att gtg acc aac ggg gcg | 336 |
| Leu Pro Gln Tyr Leu Ser Pro His Glu Gly Ile Val Thr Asn Gly Ala | |
| 100 105 110 | |

| | |
|---|-----|
| tat caa gtg atg ggg cag caa ggc aat ctc atc cat ttg gaa aag aac | 384 |
| Tyr Gln Val Met Gly Gln Gln Gly Asn Leu Ile His Leu Glu Lys Asn | |
| 115 120 125 | |

| | |
|---|-----|
| ccg caa tat tgg gcg aaa gaa aaa gtg gcg ttt aaa aat gtg gat tat | 432 |
| Pro Gln Tyr Trp Ala Lys Glu Lys Val Ala Phe Lys Asn Val Asp Tyr | |
| 130 135 140 | |

| | |
|---|-----|
| cag aaa atc gca ctg caa cag gac gtc agc gcc tta gat gtg gtg tgg | 480 |
| Gln Lys Ile Ala Leu Gln Gln Asp Val Ser Ala Leu Asp Val Val Trp | |
| 145 150 155 160 | |

| | |
|---|-----|
| cag ccg cag caa caa acg gat caa acg caa tac ttc ccg caa ctt tgc | 528 |
| Gln Pro Gln Gln Thr Asp Gln Thr Gln Tyr Phe Pro Gln Leu Cys | |
| 165 170 175 | |

| | |
|---|-----|
| acc tat ttt tac acc ttt aat ttt aac atg cca caa ctg gcg caa agc | 576 |
| Thr Tyr Phe Tyr Thr Phe Asn Phe Asn Met Pro Gln Leu Ala Gln Ser | |
| 180 185 190 | |

| | |
|---|-----|
| ccg gtg cgt aag gca ttg gca atg atg aca tct gcc cgc agt tta ttg | 624 |
| Pro Val Arg Lys Ala Leu Ala Met Met Thr Ser Ala Arg Ser Leu Leu | |

| 195 | 200 | 205 | |
|---|-----|-----|-----|
| ccg gaa agt aaa aac agg att cct tta acg gat aat ttt tta cca att | | | 672 |
| Pro Glu Ser Lys Asn Arg Ile Pro Leu Thr Asp Asn Phe Leu Pro Ile | | | |
| 210 | 215 | 220 | |
| tcc atg caa acc atc gat agc cgg tgg gag caa acg ccg gtt gaa caa | | | 720 |
| Ser Met Gln Thr Ile Asp Ser Arg Trp Glu Gln Thr Pro Val Glu Gln | | | |
| 225 | 230 | 235 | 240 |
| tta tta agc caa gcg cga att gga gag aag gca ccg ctc aaa ctg acc | | | 768 |
| Leu Leu Ser Gln Ala Arg Ile Gly Glu Lys Ala Pro Leu Lys Leu Thr | | | |
| 245 | 250 | 255 | |
| cta agt | | | 774 |
| Leu Ser | | | |

<210> 216
 <211> 258
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

 <400> 216

| | | | |
|---|-----|-----|----|
| Lys Asp Asn Lys Ile Trp His Phe Thr Leu Arg Lys Glu Ala Ile Trp | | | |
| 1 | 5 | 10 | 15 |
| Ser Asn Gly Glu Pro Val Thr Ala Gln Gln Phe Val Ala Ser Trp Gln | | | |
| 20 | 25 | 30 | |
| Arg Leu Ala Gln Ser Asp Ser Pro Leu Lys His Tyr Leu Arg Tyr Leu | | | |
| 35 | 40 | 45 | |
| Asn Leu Val Asn Ala Glu Lys Val Leu Gln Gln Thr Leu Leu Pro Glu | | | |
| 50 | 55 | 60 | |
| Gln Leu Gly Ile Val Ala Glu Asn Asp Arg Thr Leu Arg Leu Thr Leu | | | |
| 65 | 70 | 75 | 80 |
| Asp Lys Ala Thr Pro Tyr Leu Pro Gln Met Leu Ala His Ile Ser Leu | | | |
| 85 | 90 | 95 | |
| Leu Pro Gln Tyr Leu Ser Pro His Glu Gly Ile Val Thr Asn Gly Ala | | | |
| 100 | 105 | 110 | |
| Tyr Gln Val Met Gly Gln Gln Gly Asn Leu Ile His Leu Glu Lys Asn | | | |
| 115 | 120 | 125 | |

Pro Gln Tyr Trp Ala Lys Glu Lys Val Ala Phe Lys Asn Val Asp Tyr
130 135 140

Gln Lys Ile Ala Leu Gln Gln Asp Val Ser Ala Leu Asp Val Val Trp
145 150 155 160

Gln Pro Gln Gln Gln Thr Asp Gln Thr Gln Tyr Phe Pro Gln Leu Cys
165 170 175

Thr Tyr Phe Tyr Thr Phe Asn Phe Asn Met Pro Gln Leu Ala Gln Ser
180 185 190

Pro Val Arg Lys Ala Leu Ala Met Met Thr Ser Ala Arg Ser Leu Leu
195 200 205

Pro Glu Ser Lys Asn Arg Ile Pro Leu Thr Asp Asn Phe Leu Pro Ile
210 215 220

Ser Met Gln Thr Ile Asp Ser Arg Trp Glu Gln Thr Pro Val Glu Gln
225 230 235 240

Leu Leu Ser Gln Ala Arg Ile Gly Glu Lys Ala Pro Leu Lys Leu Thr
245 250 255

Leu Ser

<210> 217
<211> 363
<212> DNA
<213> Actinobacillus actinomycetemcomitans

<220>
<221> CDS
<222> (1) .. (363)

<400> 217
atc cgt att caa ccg gac gaa ggc att tct atg cgt ttt ggc ttg aaa 48
Ile Arg Ile Gln Pro Asp Glu Gly Ile Ser Met Arg Phe Gly Leu Lys
1 5 10 15

aaa ccg ggc gcc ggc ttt gaa gcc aaa gaa gtg tcg atg gat ttc cgc 96
Lys Pro Gly Ala Gly Phe Glu Ala Lys Glu Val Ser Met Asp Phe Arg
20 25 30

tat gcc gat ctt gcg ggt gcc acc gtc atg acc gct tat gag cgt tta 144
Tyr Ala Asp Leu Ala Gly Ala Thr Val Met Thr Ala Tyr Glu Arg Leu

| 35 | 40 | 45 | |
|---|-----|-----|-----|
| ttg ctt gat gcc atg aaa ggc gac gcg acc cta ttt gcg cgt acc gat | | | 192 |
| Leu Leu Asp Ala Met Lys Gly Asp Ala Thr Leu Phe Ala Arg Thr Asp | | | |
| 50 | 55 | 60 | |
| gcc gta cac gcc gcc tgg aaa ttc gtt caa ccg att ttg aac tat aaa | | | 240 |
| Ala Val His Ala Ala Trp Lys Phe Val Gln Pro Ile Leu Asn Tyr Lys | | | |
| 65 | 70 | 75 | 80 |
| gcc caa ggc ggc aga ctt tat gat tac gag gcc ggc acc tgg gga ccg | | | 288 |
| Ala Gln Gly Gly Arg Leu Tyr Asp Tyr Glu Ala Gly Thr Trp Gly Pro | | | |
| | 85 | 90 | 95 |
| acg gca gcc gat aaa ctc atc gcc aaa agc ggt cgt gta tgg cgc cgc | | | 336 |
| Thr Ala Ala Asp Lys Leu Ile Ala Lys Ser Gly Arg Val Trp Arg Arg | | | |
| | 100 | 105 | 110 |
| cca agc ggg ttg atg aag aaa aaa gtg | | | 363 |
| Pro Ser Gly Leu Met Lys Lys Lys Val | | | |
| | 115 | 120 | |
| <210> 218 | | | |
| <211> 121 | | | |
| <212> PRT | | | |
| <213> Actinobacillus actinomycetemcomitans | | | |
| <400> 218 | | | |
| Ile Arg Ile Gln Pro Asp Glu Gly Ile Ser Met Arg Phe Gly Leu Lys | | | |
| 1 | 5 | 10 | 15 |
| Lys Pro Gly Ala Gly Phe Glu Ala Lys Glu Val Ser Met Asp Phe Arg | | | |
| | 20 | 25 | 30 |
| Tyr Ala Asp Leu Ala Gly Ala Thr Val Met Thr Ala Tyr Glu Arg Leu | | | |
| | 35 | 40 | 45 |
| Leu Leu Asp Ala Met Lys Gly Asp Ala Thr Leu Phe Ala Arg Thr Asp | | | |
| | 50 | 55 | 60 |
| Ala Val His Ala Ala Trp Lys Phe Val Gln Pro Ile Leu Asn Tyr Lys | | | |
| | 65 | 70 | 75 |
| Ala Gln Gly Gly Arg Leu Tyr Asp Tyr Glu Ala Gly Thr Trp Gly Pro | | | |
| | 85 | 90 | 95 |
| Thr Ala Ala Asp Lys Leu Ile Ala Lys Ser Gly Arg Val Trp Arg Arg | | | |
| | 100 | 105 | 110 |

Pro Ser Gly Leu Met Lys Lys Lys Val
 115 120

<210> 219
 <211> 159
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1)..(159)

<400> 219
 atg gca aca ggc aaa agc att att tta atg gga gtt tcc agt aca gga 48
 Met Ala Thr Gly Lys Ser Ile Ile Leu Met Gly Val Ser Ser Thr Gly
 1 5 10 15

aaa aca tca gtg ggg acg gaa gta gca cgt cgt ttg gag ata aaa ctg 96
 Lys Thr Ser Val Gly Thr Glu Val Ala Arg Arg Leu Glu Ile Lys Leu
 20 25 30

att gat ggc gat gat ctg cac ccg cgc gcc aat atc ata aaa atg ggc 144
 Ile Asp Gly Asp Asp Leu His Pro Arg Ala Asn Ile Ile Lys Met Gly
 35 40 45

gaa gga cat ccg ctc 159
 Glu Gly His Pro Leu
 50

<210> 220
 <211> 53
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 220

Met Ala Thr Gly Lys Ser Ile Ile Leu Met Gly Val Ser Ser Thr Gly
 1 5 10 15

Lys Thr Ser Val Gly Thr Glu Val Ala Arg Arg Leu Glu Ile Lys Leu
 20 25 30

Ile Asp Gly Asp Asp Leu His Pro Arg Ala Asn Ile Ile Lys Met Gly
 35 40 45

Glu Gly His Pro Leu
 50

<210> 221
 <211> 289

<212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1)..(288)

<400> 221
 aac att gct tat gcg gcg aaa gac aaa tac agt cgt gaa gaa atc atc 48
 Asn Ile Ala Tyr Ala Ala Lys Asp Lys Tyr Ser Arg Glu Glu Ile Ile
 1 5 10 15
 aaa gcg gca aaa gcg gcg cac gcc atg gaa ttt atc gag cat ttg gaa 96
 Lys Ala Ala Lys Ala Ala His Ala Met Glu Phe Ile Glu His Leu Glu
 20 25 30
 aac ggt ctg gat acg gtt atc ggc gaa aac ggc gcc agc tta tcc ggc 144
 Asn Gly Leu Asp Thr Val Ile Gly Glu Asn Gly Ala Ser Leu Ser Gly
 35 40 45
 ggt caa cgc cag cgt tta gcc atc gcc cgc gcc ttg ttg cgt aac tcg 192
 Gly Gln Arg Gln Arg Leu Ala Ile Ala Arg Ala Leu Leu Arg Asn Ser
 50 55 60
 ccg gta ttg att tta gat gaa gcc acc tcg gca ttg gat acg gaa tcc 240
 Pro Val Leu Ile Leu Asp Glu Ala Thr Ser Ala Leu Asp Thr Glu Ser
 65 70 75 80
 gaa cgc gca att caa gcg gca ttg gaa gaa atc caa aaa gat cgc acg g 289
 Glu Arg Ala Ile Gln Ala Ala Leu Glu Glu Ile Gln Lys Asp Arg Thr
 85 90 95

<210> 222
 <211> 96
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 222
 Asn Ile Ala Tyr Ala Ala Lys Asp Lys Tyr Ser Arg Glu Glu Ile Ile
 1 5 10 15
 Lys Ala Ala Lys Ala Ala His Ala Met Glu Phe Ile Glu His Leu Glu
 20 25 30
 Asn Gly Leu Asp Thr Val Ile Gly Glu Asn Gly Ala Ser Leu Ser Gly
 35 40 45
 Gly Gln Arg Gln Arg Leu Ala Ile Ala Arg Ala Leu Leu Arg Asn Ser
 50 55 60
 Pro Val Leu Ile Leu Asp Glu Ala Thr Ser Ala Leu Asp Thr Glu Ser

65

70

75

80

Glu Arg Ala Ile Gln Ala Ala Leu Glu Glu Ile Gln Lys Asp Arg Thr
 85 90 95

<210> 223

<211> 353

<212> DNA

<213> Actinobacillus actinomycetemcomitans

<220>

<221> CDS

<222> (1)..(351)

<400> 223

tcg aac atc aac cct gat gat cca agt gcg att atc gaa ggc aac gaa 48
 Ser Asn Ile Asn Pro Asp Asp Pro Ser Ala Ile Ile Glu Gly Asn Glu
 1 5 10 15

aaa gtg gtt cgc cct cgt tta acc gac gcg gaa ttc ttc tcc aaa acc 96
 Lys Val Val Arg Pro Arg Leu Thr Asp Ala Glu Phe Phe Ser Lys Thr
 20 25 30

gac tta aaa caa aaa tta gtg gat cgc tta ccg cgc ttg gaa act gtg 144
 Asp Leu Lys Gln Lys Leu Val Asp Arg Leu Pro Arg Leu Glu Thr Val
 35 40 45

ttg ttc caa caa caa ctt ggc aca ttg cgt gat aaa acc gac cgc atc 192
 Leu Phe Gln Gln Gln Leu Gly Thr Leu Arg Asp Lys Thr Asp Arg Ile
 50 55 60

gaa caa ctt gcg ggt gca atc gcc aaa caa atc ggt gcc gac gaa gcg 240
 Glu Gln Leu Ala Gly Ala Ile Ala Lys Gln Ile Gly Ala Asp Glu Ala
 65 70 75 80

aaa gca aaa cgt gcg ggc ttg ctg tca aaa tgc gat ttg atg acc aat 288
 Lys Ala Lys Arg Ala Gly Leu Leu Ser Lys Cys Asp Leu Met Thr Asn
 85 90 95

atg gtg ttt gaa ttc acc gac acc caa ggc gta atg ggt atg cac tat 336
 Met Val Phe Glu Phe Thr Asp Thr Gln Gly Val Met Gly Met His Tyr
 100 105 110

gcc cgt cac gac ggc ga 353
 Ala Arg His Asp Gly
 115

<210> 224

<211> 117

<212> PRT

<213> Actinobacillus actinomycetemcomitans

<400> 224

Ser Asn Ile Asn Pro Asp Asp Pro Ser Ala Ile Ile Glu Gly Asn Glu
1 5 10 15

Lys Val Val Arg Pro Arg Leu Thr Asp Ala Glu Phe Phe Ser Lys Thr
20 25 30

Asp Leu Lys Gln Lys Leu Val Asp Arg Leu Pro Arg Leu Glu Thr Val
35 40 45

Leu Phe Gln Gln Gln Leu Gly Thr Leu Arg Asp Lys Thr Asp Arg Ile
50 55 60

Glu Gln Leu Ala Gly Ala Ile Ala Lys Gln Ile Gly Ala Asp Glu Ala
65 70 75 80

Lys Ala Lys Arg Ala Gly Leu Leu Ser Lys Cys Asp Leu Met Thr Asn
85 90 95

Met Val Phe Glu Phe Thr Asp Thr Gln Gly Val Met Gly Met His Tyr
100 105 110

Ala Arg His Asp Gly
115

<210> 225
<211> 366
<212> DNA
<213> Actinobacillus actinomycetemcomitans

<220>
<221> CDS
<222> (1) .. (366)

<400> 225
cta ttg gaa aaa caa ggg tta att aaa tta aaa gat ccg acc aac ctg 48
Leu Leu Glu Lys Gln Gly Leu Ile Lys Leu Lys Asp Pro Thr Asn Leu
1 5 10 15

ttc tcc act tct ata gat atc att gaa aat ccg aaa aat tta caa atc 96
Phe Ser Thr Ser Ile Asp Ile Ile Glu Asn Pro Lys Asn Leu Gln Ile
20 25 30

aaa gaa gtg gat acc tcc gtt gcg gca cgt gcc tta gat gac gtt gat 144
Lys Glu Val Asp Thr Ser Val Ala Ala Arg Ala Leu Asp Asp Val Asp
35 40 45

ttg gcg gta gtg aat aac aac tac gcc ggt caa gta ggc tta aat gcg 192
Leu Ala Val Val Asn Asn Asn Tyr Ala Gly Gln Val Gly Leu Asn Ala
50 55 60

| | |
|---|-----|
| caa gat cac ggc gta ttt gtg gaa gat aaa gat tca ccg tat gta aat | 240 |
| Gln Asp His Gly Val Phe Val Glu Asp Lys Asp Ser Pro Tyr Val Asn | |
| 65 70 75 80 | |

| | |
|---|-----|
| att atc gtg gca cgg acc gat aac aaa gac agc aaa gcc gta cag act | 288 |
| Ile Ile Val Ala Arg Thr Asp Asn Lys Asp Ser Lys Ala Val Gln Thr | |
| 85 90 95 | |

| | |
|---|-----|
| ttc gtg aaa gcc tac caa acc ccg gaa gtg gaa caa gaa gcg aaa aaa | 336 |
| Phe Val Lys Ala Tyr Gln Thr Pro Glu Val Glu Gln Glu Ala Lys Lys | |
| 100 105 110 | |

| | |
|---|-----|
| cac ttt aaa gac ggc gtg gta aaa ggc tgg | 366 |
| His Phe Lys Asp Gly Val Val Lys Gly Trp | |
| 115 120 | |

<210> 226
 <211> 122
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 226

| |
|---|
| Leu Leu Glu Lys Gln Gly Leu Ile Lys Leu Lys Asp Pro Thr Asn Leu |
| 1 5 10 15 |

| |
|---|
| Phe Ser Thr Ser Ile Asp Ile Ile Glu Asn Pro Lys Asn Leu Gln Ile |
| 20 25 30 |

| |
|---|
| Lys Glu Val Asp Thr Ser Val Ala Ala Arg Ala Leu Asp Asp Val Asp |
| 35 40 45 |

| |
|---|
| Leu Ala Val Val Asn Asn Asn Tyr Ala Gly Gln Val Gly Leu Asn Ala |
| 50 55 60 |

| |
|---|
| Gln Asp His Gly Val Phe Val Glu Asp Lys Asp Ser Pro Tyr Val Asn |
| 65 70 75 80 |

| |
|---|
| Ile Ile Val Ala Arg Thr Asp Asn Lys Asp Ser Lys Ala Val Gln Thr |
| 85 90 95 |

| |
|---|
| Phe Val Lys Ala Tyr Gln Thr Pro Glu Val Glu Gln Glu Ala Lys Lys |
| 100 105 110 |

| |
|---|
| His Phe Lys Asp Gly Val Val Lys Gly Trp |
| 115 120 |

<210> 227
 <211> 465
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1)..(465)

<400> 227
 atg act tgg caa aac gtg tcg atc atc gtt agt tat cct caa act gac 48
 Met Thr Trp Gln Asn Val Ser Ile Ile Val Ser Tyr Pro Gln Thr Asp
 1 5 10 15
 ata aaa agg gga tct ttt atg aac ttg aaa aaa tta tta ggc gtc gca 96
 Ile Lys Arg Gly Ser Phe Met Asn Leu Lys Lys Leu Leu Gly Val Ala
 20 25 30
 aca tta gcc tcc gta ttc gcc tta acg gct tgt aat gaa gag aaa aaa 144
 Thr Leu Ala Ser Val Phe Ala Leu Thr Ala Cys Asn Glu Glu Lys Lys
 35 40 45
 ccg gaa gcc gca ccg gca gac aaa ccg gcg gca gaa gcc ccg gca aca 192
 Pro Glu Ala Ala Pro Ala Asp Lys Pro Ala Ala Glu Ala Pro Ala Thr
 50 55 60
 atc aaa gtg ggc gtg atg gca gga ccg gaa cac caa gtg gct gaa atc 240
 Ile Lys Val Gly Val Met Ala Gly Pro Glu His Gln Val Ala Glu Ile
 65 70 75 80
 gca gcg aaa gtg gca aaa gaa aaa tac aac tta gac gta gaa tac gtt 288
 Ala Ala Lys Val Ala Lys Glu Lys Tyr Asn Leu Asp Val Glu Tyr Val
 85 90 95
 tta ttc aat gac tac gcc ttg cca aac act gca gtg tct aaa ggt gat 336
 Leu Phe Asn Asp Tyr Ala Leu Pro Asn Thr Ala Val Ser Lys Gly Asp
 100 105 110
 tta gac gtt aac gca atg caa cat aaa ccg tat tta gac aaa gat tcc 384
 Leu Asp Val Asn Ala Met Gln His Lys Pro Tyr Leu Asp Lys Asp Ser
 115 120 125
 caa gcg aaa gga ttg aac aac tta gtg atc gtg ggt aat acc ttc gtt 432
 Gln Ala Lys Gly Leu Asn Asn Leu Val Ile Val Gly Asn Thr Phe Val
 130 135 140
 tac ccg tta gcc ggc tat tca aaa aaa atc aaa 465
 Tyr Pro Leu Ala Gly Tyr Ser Lys Lys Ile Lys
 145 150 155

<210> 228
 <211> 155
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 228

Met Thr Trp Gln Asn Val Ser Ile Ile Val Ser Tyr Pro Gln Thr Asp
1 5 10 15

Ile Lys Arg Gly Ser Phe Met Asn Leu Lys Lys Leu Leu Gly Val Ala
20 25 30

Thr Leu Ala Ser Val Phe Ala Leu Thr Ala Cys Asn Glu Glu Lys Lys
35 40 45

Pro Glu Ala Ala Pro Ala Asp Lys Pro Ala Ala Glu Ala Pro Ala Thr
50 55 60

Ile Lys Val Gly Val Met Ala Gly Pro Glu His Gln Val Ala Glu Ile
65 70 75 80

Ala Ala Lys Val Ala Lys Glu Lys Tyr Asn Leu Asp Val Glu Tyr Val
85 90 95

Leu Phe Asn Asp Tyr Ala Leu Pro Asn Thr Ala Val Ser Lys Gly Asp
100 105 110

Leu Asp Val Asn Ala Met Gln His Lys Pro Tyr Leu Asp Lys Asp Ser
115 120 125

Gln Ala Lys Gly Leu Asn Asn Leu Val Ile Val Gly Asn Thr Phe Val
130 135 140

Tyr Pro Leu Ala Gly Tyr Ser Lys Lys Ile Lys
145 150 155

<210> 229
<211> 1008
<212> DNA
<213> Actinobacillus actinomycetemcomitans

<220>
<221> CDS
<222> (1) .. (1008)

<400> 229
atg atg gaa ctc gcc tat ttg caa aaa acg ccg cca aaa cag acc gca 48
Met Met Glu Leu Ala Tyr Leu Gln Lys Thr Pro Pro Lys Gln Thr Ala
1 5 10 15

ctt tta aaa gcg gaa tgc gcg gat ttt gtc gtc aaa gag caa ctg ggc 96
Leu Leu Lys Ala Glu Cys Ala Asp Phe Val Val Lys Glu Gln Leu Gly

| | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|--|--|-----|--|
| | | | | 20 | | | | 25 | | | | 30 | | | | | | | | |
| tac | gac | atg | agc | ggc | gac | ggc | gaa | ttc | gtg | gcg | gtg | aaa | ata | cgc | aaa | | | | 144 | |
| Tyr | Asp | Met | Ser | Gly | Asp | Gly | Glu | Phe | Val | Ala | Val | Lys | Ile | Arg | Lys | | | | | |
| 35 | | | | 40 | | | | 45 | | | | | | | | | | | | |
| acc | gat | tgc | aac | acc | ttg | ttt | gta | ggc | gag | caa | ctg | gcg | aaa | ttc | gcc | | | | 192 | |
| Thr | Asp | Cys | Asn | Thr | Leu | Phe | Val | Gly | Glu | Gln | Leu | Ala | Lys | Phe | Ala | | | | | |
| 50 | | | | 55 | | | | 60 | | | | | | | | | | | | |
| ggc | att | tcg | gca | cgc | aac | atg | agt | tat | gcc | ggt | ttg | aaa | gat | cgc | aaa | | | | 240 | |
| Gly | Ile | Ser | Ala | Arg | Asn | Met | Ser | Tyr | Ala | Gly | Leu | Lys | Asp | Arg | Lys | | | | | |
| 65 | 70 | | | | 75 | | | | 80 | | | | | | | | | | | |
| gct | gtc | acc | gaa | caa | tgg | ttc | agc | ctg | caa | atg | ccc | ggg | caa | ccg | acg | | | | 288 | |
| Ala | Val | Thr | Glu | Gln | Trp | Phe | Ser | Leu | Gln | Met | Pro | Gly | Gln | Pro | Thr | | | | | |
| 85 | | | | 90 | | | | 95 | | | | | | | | | | | | |
| ccg | gat | ttc | agc | caa | ttt | cac | ctt | gac | ggc | gtg | gat | att | ctt | gaa | gtg | | | | 336 | |
| Pro | Asp | Phe | Ser | Gln | Phe | His | Leu | Asp | Gly | Val | Asp | Ile | Leu | Glu | Val | | | | | |
| 100 | | | | 105 | | | | 110 | | | | | | | | | | | | |
| acc | cgc | cac | caa | cgc | aaa | atc | cgt | atc | ggc | agc | ctg | caa | ggc | aat | cat | | | | 384 | |
| Thr | Arg | His | Gln | Arg | Lys | Ile | Arg | Ile | Gly | Ser | Leu | Gln | Gly | Asn | His | | | | | |
| 115 | | | | 120 | | | | 125 | | | | | | | | | | | | |
| ttt | gag | att | ttg | ctg | cgc | cac | gcg | gaa | gaa | acc | gac | gag | ctc | aaa | gtg | | | | 432 | |
| Phe | Glu | Ile | Leu | Leu | Arg | His | Ala | Glu | Glu | Thr | Asp | Glu | Leu | Lys | Val | | | | | |
| 130 | | | | 135 | | | | 140 | | | | | | | | | | | | |
| cgg | ttg | gat | ttt | ctg | gca | aaa | aac | ggc | ttc | ccc | aat | tat | ttc | acc | gaa | | | | 480 | |
| Arg | Leu | Asp | Phe | Leu | Ala | Lys | Asn | Gly | Phe | Pro | Asn | Tyr | Phe | Thr | Glu | | | | | |
| 145 | 150 | | | | 155 | | | | 160 | | | | | | | | | | | |
| cag | cgt | ttc | ggg | cgc | gac | ggc | aac | aat | ctc | acc | caa | gcc | cta | cgc | tgg | | | | 528 | |
| Gln | Arg | Phe | Gly | Arg | Asp | Gly | Asn | Asn | Leu | Thr | Gln | Ala | Leu | Arg | Trp | | | | | |
| 165 | | | | 170 | | | | 175 | | | | | | | | | | | | |
| gcg | gcg | ggc | gaa | atc | aaa | gtg | aaa | gat | cgc | aac | aag | cgc | agt | ttc | tat | | | | 576 | |
| Ala | Ala | Gly | Glu | Ile | Lys | Val | Lys | Asp | Arg | Asn | Lys | Arg | Ser | Phe | Tyr | | | | | |
| 180 | | | | 185 | | | | 190 | | | | | | | | | | | | |
| att | tcc | gcc | gcc | cgc | agt | gag | att | ttc | aat | tta | atc | gtt | gcc | aaa | cgt | | | | 624 | |
| Ile | Ser | Ala | Ala | Arg | Ser | Glu | Ile | Phe | Asn | Leu | Ile | Val | Ala | Lys | Arg | | | | | |
| 195 | | | | 200 | | | | 205 | | | | | | | | | | | | |
| att | gaa | ctc | agt | ctg | gcg | cag | cag | gtc | tta | aat | gga | gac | gtt | ttg | caa | | | | 672 | |
| Ile | Glu | Leu | Ser | Leu | Ala | Gln | Gln | Val | Leu | Asn | Gly | Asp | Val | Leu | Gln | | | | | |
| 210 | | | | 215 | | | | 220 | | | | | | | | | | | | |
| ctg | aac | ggt | tcg | cac | agt | tgg | ttt | gtg | gcg | gac | gca | tcg | gaa | gat | ttg | | | | 720 | |
| Leu | Asn | Gly | Ser | His | Ser | Trp | Phe | Val | Ala | Asp | Ala | Ser | Glu | Asp | Leu | | | | | |
| 225 | 230 | | | | 235 | | | | 240 | | | | | | | | | | | |
| acg | caa | ctg | caa | caa | cgc | ttg | gca | caa | cgg | gat | att | ttg | ctt | acc | gca | | | | 768 | |
| Thr | Gln | Leu | Gln | Gln | Arg | Leu | Ala | Gln | Arg | Asp | Ile | Leu | Leu | Thr | Ala | | | | | |
| 245 | | | | 250 | | | | 255 | | | | | | | | | | | | |

ccg ctt atc ggc gaa gag gac aaa agt gcg gtg gat ttt gag aat gaa 816
 Pro Leu Ile Gly Glu Glu Asp Lys Ser Ala Val Asp Phe Glu Asn Glu
 260 265 270

att ttt gtc gcg cac caa gcc ttg ttc cat ttg atg cgg caa gaa cgc 864
 Ile Phe Val Ala His Gln Ala Leu Phe His Leu Met Arg Gln Glu Arg
 275 280 285

gtg aaa gcc gcc cgc cgt ccg att tta atg cag gcg caa cag ttt caa 912
 Val Lys Ala Ala Arg Arg Pro Ile Leu Met Gln Ala Gln Gln Phe Gln
 290 295 300

tgg caa ttt gaa ccg aac ggt ttg cgc ctt aaa ttt tat ttg ccg gca 960
 Trp Gln Phe Glu Pro Asn Gly Leu Arg Leu Lys Phe Tyr Leu Pro Ala
 305 310 315 320

ggc agt tac gcc acg gcg ttg gta cgc gag ctg gtg aat gtt gaa aac 1008
 Gly Ser Tyr Ala Thr Ala Leu Val Arg Glu Leu Val Asn Val Glu Asn
 325 330 335

<210> 230
 <211> 336
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 230

Met Met Glu Leu Ala Tyr Leu Gln Lys Thr Pro Pro Lys Gln Thr Ala
 1 5 10 15

Leu Leu Lys Ala Glu Cys Ala Asp Phe Val Val Lys Glu Gln Leu Gly
 20 25 30

Tyr Asp Met Ser Gly Asp Gly Glu Phe Val Ala Val Lys Ile Arg Lys
 35 40 45

Thr Asp Cys Asn Thr Leu Phe Val Gly Glu Gln Leu Ala Lys Phe Ala
 50 55 60

Gly Ile Ser Ala Arg Asn Met Ser Tyr Ala Gly Leu Lys Asp Arg Lys
 65 70 75 80

Ala Val Thr Glu Gln Trp Phe Ser Leu Gln Met Pro Gly Gln Pro Thr
 85 90 95

Pro Asp Phe Ser Gln Phe His Leu Asp Gly Val Asp Ile Leu Glu Val
 100 105 110

Thr Arg His Gln Arg Lys Ile Arg Ile Gly Ser Leu Gln Gly Asn His
 115 120 125

Phe Glu Ile Leu Leu Arg His Ala Glu Glu Thr Asp Glu Leu Lys Val
 130 135 140

Arg Leu Asp Phe Leu Ala Lys Asn Gly Phe Pro Asn Tyr Phe Thr Glu
 145 150 155 160

Gln Arg Phe Gly Arg Asp Gly Asn Asn Leu Thr Gln Ala Leu Arg Trp
 165 170 175

Ala Ala Gly Glu Ile Lys Val Lys Asp Arg Asn Lys Arg Ser Phe Tyr
 180 185 190

Ile Ser Ala Ala Arg Ser Glu Ile Phe Asn Leu Ile Val Ala Lys Arg
 195 200 205

Ile Glu Leu Ser Leu Ala Gln Gln Val Leu Asn Gly Asp Val Leu Gln
 210 215 220

Leu Asn Gly Ser His Ser Trp Phe Val Ala Asp Ala Ser Glu Asp Leu
 225 230 235 240

Thr Gln Leu Gln Gln Arg Leu Ala Gln Arg Asp Ile Leu Leu Thr Ala
 245 250 255

Pro Leu Ile Gly Glu Glu Asp Lys Ser Ala Val Asp Phe Glu Asn Glu
 260 265 270

Ile Phe Val Ala His Gln Ala Leu Phe His Leu Met Arg Gln Glu Arg
 275 280 285

Val Lys Ala Ala Arg Arg Pro Ile Leu Met Gln Ala Gln Gln Phe Gln
 290 295 300

Trp Gln Phe Glu Pro Asn Gly Leu Arg Leu Lys Phe Tyr Leu Pro Ala
 305 310 315 320

Gly Ser Tyr Ala Thr Ala Leu Val Arg Glu Leu Val Asn Val Glu Asn
 325 330 335

<210> 231

<211> 738
 <212> DNA
 <213> Actinobacillus actinomycetemcomitans

<220>
 <221> CDS
 <222> (1)..(738)

<400> 231

| | |
|---|-----|
| atg aat att tta tta agt aac gat gac ggc att cac gcg ccg ggc att | 48 |
| Met Asn Ile Leu Leu Ser Asn Asp Asp Gly Ile His Ala Pro Gly Ile | |
| 1 5 10 15 | |
| cggtgtgatgca gaa gca ttg cgt aag att gcc aat gtg acc atc gtc | 96 |
| Arg Val Met Ala Glu Ala Leu Arg Lys Ile Ala Asn Val Thr Ile Val | |
| 20 25 30 | |
| gcg ccg gac agc aac cgc agc gcc gcc tcc agt tcc tta acc ttg gtg | 144 |
| Ala Pro Asp Ser Asn Arg Ser Ala Ala Ser Ser Ser Leu Thr Leu Val | |
| 35 40 45 | |
| aag ccg ttg tat ccg tta cat ttg gaa agc ggt gat tat tgc gtc aac | 192 |
| Lys Pro Leu Tyr Pro Leu His Leu Glu Ser Gly Asp Tyr Cys Val Asn | |
| 50 55 60 | |
| ggc acg ccg gcg gat tgc gtg cat att gcg ctg aac ggt ttt ctt tcc | 240 |
| Gly Thr Pro Ala Asp Cys Val His Ile Ala Leu Asn Gly Phe Leu Ser | |
| 65 70 75 80 | |
| ggg cgc atc gat ttg gtg att tcc ggc atc aac gcc ggg gcg aac ctg | 288 |
| Gly Arg Ile Asp Leu Val Ile Ser Gly Ile Asn Ala Gly Ala Asn Leu | |
| 85 90 95 | |
| ggc gat gat gtg cta tat tcc ggc acg gtc gcg gca gca ttt gaa ggg | 336 |
| Gly Asp Asp Val Leu Tyr Ser Gly Thr Val Ala Ala Ala Phe Glu Gly | |
| 100 105 110 | |
| cggtcatctggc ttg ccg tct att gcg gta tcg ctc gat ggt cgt caa | 384 |
| Arg His Leu Gly Leu Pro Ser Ile Ala Val Ser Leu Asp Gly Arg Gln | |
| 115 120 125 | |
| cat ttt gaa acg gcg gcg cgc gtg gta tgc gat ttg gtg ccg aaa tta | 432 |
| His Phe Glu Thr Ala Ala Arg Val Val Cys Asp Leu Val Pro Lys Leu | |
| 130 135 140 | |
| cac gcc caa tta tta ggc aaa cac gaa att ctg aat att aac gtg ccc | 480 |
| His Ala Gln Leu Leu Gly Lys His Glu Ile Leu Asn Ile Asn Val Pro | |
| 145 150 155 160 | |
| gat gtg cct tac gaa gaa ctg aaa ggc att aaa gtg tgc cat ttg ggc | 528 |
| Asp Val Pro Tyr Glu Glu Leu Lys Gly Ile Lys Val Cys His Leu Gly | |
| 165 170 175 | |
| tac cgt tct tcc gct tct gaa gtg att aaa cag caa agc ccg cgt ggc | 576 |
| Tyr Arg Ser Ser Ala Ser Glu Val Ile Lys Gln Gln Ser Pro Arg Gly | |
| 180 185 190 | |

gaa gac atg tat tgg atc ggg ctc agc ggc ttg ccg gaa tat gaa agc 624
 Glu Asp Met Tyr Trp Ile Gly Leu Ser Gly Leu Pro Glu Tyr Glu Ser
 195 200 205

gaa ggc acc gat ttc cac gcg gtg aaa aac ggc tat gtt tcc att acg 672
 Glu Gly Thr Asp Phe His Ala Val Lys Asn Gly Tyr Val Ser Ile Thr
 210 215 220

ccg att cag gtg gac atg acc gcg cac cac tca atc aac gct tta caa 720
 Pro Ile Gln Val Asp Met Thr Ala His His Ser Ile Asn Ala Leu Gln
 225 230 235 240

cgt tgg tta gaa agt gaa 738
 Arg Trp Leu Glu Ser Glu
 245

<210> 232
 <211> 246
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 232

Met Asn Ile Leu Leu Ser Asn Asp Asp Gly Ile His Ala Pro Gly Ile
 1 5 10 15

Arg Val Met Ala Glu Ala Leu Arg Lys Ile Ala Asn Val Thr Ile Val
 20 25 30

Ala Pro Asp Ser Asn Arg Ser Ala Ala Ser Ser Ser Leu Thr Leu Val
 35 40 45

Lys Pro Leu Tyr Pro Leu His Leu Glu Ser Gly Asp Tyr Cys Val Asn
 50 55 60

Gly Thr Pro Ala Asp Cys Val His Ile Ala Leu Asn Gly Phe Leu Ser
 65 70 75 80

Gly Arg Ile Asp Leu Val Ile Ser Gly Ile Asn Ala Gly Ala Asn Leu
 85 90 95

Gly Asp Asp Val Leu Tyr Ser Gly Thr Val Ala Ala Ala Phe Glu Gly
 100 105 110

Arg His Leu Gly Leu Pro Ser Ile Ala Val Ser Leu Asp Gly Arg Gln
 115 120 125

His Phe Glu Thr Ala Ala Arg Val Val Cys Asp Leu Val Pro Lys Leu

130

135

140

His Ala Gln Leu Leu Gly Lys His Glu Ile Leu Asn Ile Asn Val Pro
 145 150 155 160

Asp Val Pro Tyr Glu Glu Leu Lys Gly Ile Lys Val Cys His Leu Gly
 165 170 175

Tyr Arg Ser Ser Ala Ser Glu Val Ile Lys Gln Gln Ser Pro Arg Gly
 180 185 190

Glu Asp Met Tyr Trp Ile Gly Leu Ser Gly Leu Pro Glu Tyr Glu Ser
 195 200 205

Glu Gly Thr Asp Phe His Ala Val Lys Asn Gly Tyr Val Ser Ile Thr
 210 215 220

Pro Ile Gln Val Asp Met Thr Ala His His Ser Ile Asn Ala Leu Gln
 225 230 235 240

Arg Trp Leu Glu Ser Glu
 245

<210> 233

<211> 426

<212> DNA

<213> Actinobacillus actinomycetemcomitans

<220>

<221> CDS

<222> (1) .. (426)

<400> 233

gat ctg ccg ttg gcg aac cct tac gaa atg ctg atc ctc gcg tcc atc 48
 Asp Leu Pro Leu Ala Asn Pro Tyr Glu Met Leu Ile Leu Ala Ser Ile
 1 5 10 15

gtg gaa aaa gaa acc ggc att gct gca gaa cgc cca caa gtg gcg tcg 96
 Val Glu Lys Glu Thr Gly Ile Ala Ala Glu Arg Pro Gln Val Ala Ser
 20 25 30

gta ttc att aat cgg tta aaa gcc aaa atg aag ctg caa acc gat ccg 144
 Val Phe Ile Asn Arg Leu Lys Ala Lys Met Lys Leu Gln Thr Asp Pro
 35 40 45

acc gtc att tac ggc atg ggc gac gac tac aac ggc aat att cgc aaa 192
 Thr Val Ile Tyr Gly Met Gly Asp Asp Tyr Asn Gly Asn Ile Arg Lys
 50 55 60

aaa gat ttg gaa acg cca acg cct tat aac acc tat gtg att gac ggc 240
 Lys Asp Leu Glu Thr Pro Thr Pro Tyr Asn Thr Tyr Val Ile Asp Gly
 65 70 75 80

ttg ccg ccg aca ccg att gcg atg ccg agt gaa gag gcg tta cag gcg 288
 Leu Pro Pro Thr Pro Ile Ala Met Pro Ser Glu Glu Ala Leu Gln Ala
 85 90 95

gtg gca cat ccg gcg caa acg gcg ttt tat tat ttc gtg gca gac ggc 336
 Val Ala His Pro Ala Gln Thr Ala Phe Tyr Tyr Phe Val Ala Asp Gly
 100 105 110

acg ggg gga cac aaa ttc agt cgt aat tta aac gaa cat aac aaa gcg 384
 Thr Gly Gly His Lys Phe Ser Arg Asn Leu Asn Glu His Asn Lys Ala
 115 120 125

gtg cag caa tat ttg cgc tgg tac cgc gaa caa aac gga aaa 426
 Val Gln Gln Tyr Leu Arg Trp Tyr Arg Glu Gln Asn Gly Lys
 130 135 140

<210> 234
 <211> 142
 <212> PRT
 <213> Actinobacillus actinomycetemcomitans

<400> 234

Asp Leu Pro Leu Ala Asn Pro Tyr Glu Met Leu Ile Leu Ala Ser Ile
 1 5 10 15

Val Glu Lys Glu Thr Gly Ile Ala Ala Glu Arg Pro Gln Val Ala Ser
 20 25 30

Val Phe Ile Asn Arg Leu Lys Ala Lys Met Lys Leu Gln Thr Asp Pro
 35 40 45

Thr Val Ile Tyr Gly Met Gly Asp Asp Tyr Asn Gly Asn Ile Arg Lys
 50 55 60

Lys Asp Leu Glu Thr Pro Thr Pro Tyr Asn Thr Tyr Val Ile Asp Gly
 65 70 75 80

Leu Pro Pro Thr Pro Ile Ala Met Pro Ser Glu Glu Ala Leu Gln Ala
 85 90 95

Val Ala His Pro Ala Gln Thr Ala Phe Tyr Tyr Phe Val Ala Asp Gly
 100 105 110

Thr Gly Gly His Lys Phe Ser Arg Asn Leu Asn Glu His Asn Lys Ala

